Single Farm Payment in the European Union and Its Implications on New Zealand Dairy and Beef Trade

Klaus Kogler

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Agribusiness & Economics Research Unit
Lincoln University
PO Box 84
Lincoln 7647
New Zealand

Ph: (64) (3) 325-3604
Fax: (64) (3) 325 3679
www.lincoln.ac.nz/story9430.html?

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Dairy products and beef are New Zealand's main export commodities, accounting for 22 per cent of total merchandise exports (Statistics New Zealand, 2005). The European Union (EU) is commonly known for distorting international trade in these products through subsidised production and exports. This leads to lower world market prices and hence lower export revenues for New Zealand. On the other hand, New Zealand benefits from high domestic EU prices through preferential access to the butter, cheese and sheepmeat markets.

The Common Agricultural Policy (CAP) of the EU has already undergone several reforms in recent years. The 2003 CAP reform replaced the coupled direct support schemes by a Single Farm Payment (SFP), which will be mainly delivered to farmers irrespective of what they produce (hence 'decoupled' from production). The level of decoupling differs among the EU Member States. This report assesses the implementation of the SFP across Member States and how far it has been decoupled. The expected changes in the European Union's and New Zealand's trade in dairy products and beef resulting from the 2003 reform of the CAP are simulated, using a partial equilibrium trade model (Lincoln Trade and Environment Model; LTEM).

The hypothesis is that a higher degree of decoupling of direct payments leads to a lower production and less EU exports. Hence, opportunities for NZ exports of dairy products and beef could increase. The results from the dairy sector are the opposite of the hypothesis: EU exports in dairy products are predicted to increase following the reform and this implies New Zealand exports to fall by 1.5 per cent to 2.0 per cent. This is due to a rise of the internal milk production quota in the course of the reform which outweighs the impact of the decoupling of the dairy premium. In the beef sector, EU outputs will be reduced as a result of the 2003 CAP reform. The market changes in the EU, however, are only partly transmitted to New Zealand because other beef producers also benefit. The returns to New Zealand beef producers increase by more if full decoupling in all EU Member States is applied then in case of only partial decoupling.

Key words: Single Farm Payment, European Union, New Zealand, Common Agricultural Policy, direct payments

Chapter 1
Introduction

Dairy products and beef are New Zealand's main export commodities, accounting for 22 per cent of total merchandise exports (Statistics New Zealand, 2005). The European Union (EU) is commonly known for distorting international trade in these products through subsidised production and exports. This leads to lower world market prices and hence lower export revenues for New Zealand (NZ). On the other hand, NZ benefits from high domestic EU prices through preferential access to the butter, cheese and sheepmeat markets.

Both the EU and NZ are major players in the international dairy and beef markets. It can be expected that a significant change in production and trade in one nation will affect world trade and hence the other nation. Dairy and beef exports from the EU result from supported production and are mainly subsidised, whereas the NZ agricultural sector is liberalised. The agricultural sector in the EU is heavily regulated by the Common Agricultural Policy (CAP).

The CAP has already undergone several reforms in recent years. It is moving from a mainly market price supporting policy towards a more comprehensive agricultural environment policy. Besides internal reasons, another main driving force of the CAP reform process is international pressure placed on the EU in the Doha Round negotiations of the World Trade Organisation (WTO). The argument is that EU agricultural subsidies distort production and trade of agricultural commodities (Binfield et al, 2004). The redirection of agricultural support from market price support to direct aids has started in the McSharry reforms of 1992. A future objective is the complete shift over to non-production-related farm assistance across all CAP-covered products (CTA, 2006). An important step towards this objective was the 2003 CAP reform (also referred as the 'Luxembourg Agreement' or 'Fischler reforms').

The 2003 CAP reform replaced the coupled direct support schemes by a Single Farm Payment (SFP) and cut – at least partially – the link between support and production. The SFP is delivered to farmers independent of what and how much they produce (hence 'decoupled' from production) and it is based on historical entitlements. Economic theory suggests that if coupled subsidies are replaced with payments that are totally decoupled from production, then production should fall to a level that would exist without any subsidies (Andersson, 2004). However, the SFP is implemented in different ways across the Member States of the EU. Member States could choose individually to maintain a limited link between direct payment and production.

This report assesses the implementation of the SFP across Member States and how far it has been decoupled. The expected changes in the European Union's and New Zealand's production and trade in dairy products and beef resulting from the 2003 reform of the CAP are simulated, using a partial equilibrium trade model (Lincoln Trade and Environment Model; LTEM).

1.1 Hypothesis

A higher degree of decoupling of direct payments leads to a lower production and less EU exports. Hence, opportunities for NZ exports of dairy products and beef could increase.

1.2 Research objectives

The main objective of this report is to look at the implementation of the SFP across Member States and assess the implications of the CAP reform on EU and NZ dairy and beef sectors. The specific objectives include:

***Objective I*: Comparison of the agricultural policy system in the EU and NZ**

NZ's free-market reforms in the 1980s brought a great change from a protected agricultural sector to an almost completely liberalised one. Although there have been several reforms of the CAP in recent years, European agriculture is still being subsidised. A literature review about the history of the European Union's Common Agricultural Policy and New Zealand's agricultural policy is carried out to compare both systems.

***Objective II*: Dairy and beef market analysis**

The main characteristics of the international dairy and beef markets are analysed, with the focus on the EU and NZ.

***Objective III*: Development of scenarios**

Scenarios are developed for different implementation schemes of the 2003 CAP reform, based on the actual implementation of three Member States. There should be one Member State which maximises decoupling, one which minimises decoupling and one in between.

***Objective IV*: Trade modelling**

This involves the simulation of the scenarios with the Lincoln Trade and Environment Model (LTEM) and calculation of the changes in producer returns in the EU and NZ dairy and beef sectors.

1.3 Organisation of the report

First, Chapter 1.4 gives an overview about the present literature analysing the implications of EU agricultural policy on NZ and the effects of the 2003 CAP reform, particularly on the dairy and beef sectors. Chapter 2 summarises the agricultural policy in the EU and NZ, with a focus on the historical development and the objectives. Further details of the 2003 CAP reform are also explained in this chapter. This is followed by a description of the dairy and beef sectors in the EU and NZ and the international trade in dairy and beef. In Chapter 4 follows a description of the methodology used to answer the research question. A partial equilibrium trade model (Lincoln Trade and Environment Model) is applied to simulate the effects of the CAP reform on NZ agriculture. The scenarios used for the trade modelling are also described in this chapter. Chapter 5 shows the results of the trade modelling and discusses them with other studies. Finally, in Chapter 6, the conclusion summarises the results and evaluates future implications of the CAP on NZ.

1.4 Literature review

The Common Agricultural Policy of the European Union and its reforms are widely discussed in the literature. There are a number of relatively recent studies analysing the impact of the CAP reforms on the agricultural sectors of countries and regions around the world, but not many publications address the impact on New Zealand in particular.

Saunders & Mayrhofer (2003) investigated the implications of change in EU agricultural policy for NZ trade; in particular the development of agri-environmental policy, using the Lincoln Trade and Environment Model (LTEM). This study was conducted before the introduction of the SFP scheme, but includes a very similar scenario as the 2003 CAP reform was at a proposal stage at that time (called Mid-Term Review of the Agenda 2000 reforms). Saunders & Mayrhofer found that dairy production in the EU will increase with the CAP reform and this has a negative impact on NZ for two reasons. Firstly, the lower internal prices in the EU cause the returns to NZ from its preferential access to fall. Secondly, higher production in the EU has a negative impact on world prices causing returns to NZ from other markets to fall as well.

Similar results are presented by Saunders (2005). In this study, the impacts of Agenda 2000, the Mid-Term Review and the EU agri-environmental programmes on the EU and NZ were assessed. The Lincoln Trade and Environment Model was used to simulate the impact on the dairy sectors of the EU and NZ of four different policy scenarios. The results state that EU milk prices will fall by 8 per cent over the period 1998 to 2010 as a result of the Agenda 2000 reform. The internal production quota for milk in the EU still binds even though it increases by 2.5 per cent over the period. The Mid-Term Review will decrease EU milk producer prices even more. However, as before, the level of production in the EU actually rises due to the increase in the internal production quota, which even at the lower prices still binds. This has again the two negative effects on NZ, mentioned in the previous study. The introduction of agri-environmental policies, conversely, causes internal EU prices to rise as the level of production this time is constrained by production practice. NZ prices for raw milk rise by 5-13 per cent with increases in NZ production of 5-13 per cent.

Saunders et al. (2006) analysed global agricultural trade policy reforms and their impact on the EU, China and NZ, using the Lincoln Trade and Environment Model. Their results show that a reduction of export subsidies and tariffs by 50 per cent all over the world results in an universal decrease in producer prices and production in the EU for livestock products. Price reductions are particularly significant for beef (38.2 per cent). In this scenario, the EU switches from being a net exporter of beef, cheese and skim milk powder to being a net importer. The impact of the reduction of export subsidies and tariffs across all countries leads to benefits for the NZ livestock sector. NZ gains most if all countries completely liberalise (complete removal of all countries' export subsidies and tariffs in 2005). Another scenario simulated an increase in the milk production quota. In this case, prices for dairy products in the EU decrease, but production in the EU increases as a result of the increase in production quota. NZ reduces dairy production and NZ exports decrease.

The milk production in the United Kingdom (UK) following the 2003 CAP reform was modelled by Colman & Harvey (2004). They emphasise the difference between the producer 'incentive' price for milk and the 'market' producer price for milk. To the extent that any producers use the SFP to support their dairy business, the incentive price driving their decisions will exceed the actual milk price they receive. In this case, the UK milk production

will remain at full national quota level until 2015. If producers treat the payment as decoupled, then a lower incentive price will apply, more producers will leave the industry and a short-term deficit in output is likely; that is, it would fall significantly below the UK national quota in 2010 and falling slightly below in 2015. Considering that the UK is one of the lowest cost milk producers in the EU-15 (Colman, 2002), this result suggests that milk production in other EU countries will fall below quota levels if the SFP is treated as completely decoupled. However, Colman and Harvey expect that most producers will effectively treat the SFP as coupled and as an aid to enable them to continue dairy farming.

The British Milk Development Council (Farmers Guardian, 2004) interviewed over 1,200 dairy farmers in the United Kingdom about their future plans after the introduction of the Single Farm Payment Scheme. In a survey in April 2004, 75 per cent of farmers stated they would use the SFP to support them in dairy farming. Six months later, in another survey, this has fallen to 62 per cent, suggesting that more farmers were planning to change enterprises if dairying is not profitable in its own right. However, still a large percentage of dairy farmers will treat the SFP as if it were coupled and hence will use it to subsidise milk production.

A survey conducted by Trantner et al. (2004) came to a similar result. They asked 4,500 farmers in each of three EU countries (the UK, Germany and Portugal) about their response to a proposed bond scheme, corresponding, more or less, to the Single Farm Payment Scheme. The survey was carried out in 2001/02, before the latest CAP reform. Around 67-69 per cent of the respondents said they would not alter their mix of farm activities after the proposed policy change was introduced. It is interesting to see how close this proportion was for each of the three countries (Germany and Portugal 67 per cent, UK 69 per cent).

Breen et al. (2005) assessed the impact of decoupling on farming in Ireland. Their result is that, despite the significant changes in profitability that decoupling could engender, the majority of farmers intend to continue as before and are unlikely to change their production patterns. A survey on farmers' intentions indicates that a large number of farmers still seem to consider the decoupled payment linked to production. Among other farmers, 499 dairy and 395 beef cattle farmers were surveyed about their intentions to remain in dairy/cattle farming. The survey indicates that 11 per cent of dairy farmers and 14 per cent of cattle farmers intend to cease their activities within the first four years of the Luxembourg Agreement. However, analysis of the profitability of Irish dairy farming suggests that up to 32 per cent of farmers are likely to exit dairy production over the ten year period from 2002.

An analysis about the 2003 CAP reform from the Organisation for Economic Cooperation and Development (OECD, 2004a) concludes that although milk production remains bound by the quota, further cuts in the intervention price for butter, compared to Agenda 2000, resulting in lower domestic prices for milk and most dairy products will lead to lower production of skimmed and whole milk powder. Significant decreases in EU dairy product exports cause world prices to increase. The OECD modelled two scenarios: a 'maximum decoupling' and a 'minimum decoupling' scenario, in which it is assumed that all Member States will either select the option that maximises or minimises the degree of decoupling. The impact of different direct payment decoupling assumptions on the dairy sector is negligible. In both scenarios, the production quota remains binding and the marginal effect of direct payments on milk production is zero. EU beef production decreases in both scenarios, but does not initially change export levels. However, imports will increase by 1.7 per cent from 2004 to 2008 in case of full decoupling. Beef production is estimated to be reduced by less if the maximum possible share of beef payments is kept linked to beef production. Under these assumptions,

beef production is reduced by less than 0.1 per cent by 2008 compared to 0.6 per cent with maximum decoupling.

Similar to the OECD, the Food and Agricultural Policy Research Institute (FAPRI, 2003) analysed the impact of the Luxembourg CAP reform agreement on EU agriculture. They also modelled a maximum and a minimum decoupling scenario, according to the Member State's decisions on the degree of decoupling. The baseline is represented by the policies agreed under Agenda 2000. The results for the dairy sector under each of the scenarios were very similar. Due to the reduction of the intervention price of butter the price of all dairy commodities will fall. Nevertheless, the production quota still remained binding and determined the milk supply. On the demand side, lower EU product prices meant higher consumption and lead to reduced volumes of EU dairy products available for export. Decoupling of beef direct payments had a significant impact on the sector. Compared to the baseline, EU beef production decreased by 2.6 per cent in the full decoupling scenario and by 0.2 per cent in case of minimum decoupling (in the average from 2007 to 2012). Net imports increased by 241.3 per cent and 22.2 per cent, respectively.

The European Commission (2005) modelled the impact of alternative implementation scenarios of the SFP on the EU-25 agricultural sector in 2012. The projected situation under the *status quo* policy implementation (as notified by Member States) was compared with two alternative scenarios: full decoupling and full coupling of direct payments in line with the provisions of the current legislation. The *status quo* policy implementation scenario predicts an increase in set aside and fallow land until 2012 through the introduction of the Single Farm Payment. Regarding livestock production, the projections indicate that the EU-25 cattle herd would slightly decrease until 2012. This would be the consequence of the quota-driven structural decline in dairy cow herd size, but also abandonment of beef production mainly in the Member States with fully decoupled cattle premiums. In comparison to the reference scenario, full decoupling of direct payments in 2012 would lead to a decrease of 1.8 per cent in total EU-25 cattle herd. In contrast, the full coupling scenario assumes that Member States couple their direct payments to the maximum extent in line with the effective CAP provisions. Compared to the reference situation, overall EU-25 cattle herd would increase by 0.5 per cent.

Huettel & Kleinhanss (2004) reviewed a number of studies about CAP reform impacts in the dairy sector in different EU countries. They focussed on milk supply effects of decoupled direct payments and on changes of producer prices. Their result is that the type of decoupling (SFP based on Historic Model or Regional Model) will not have significantly different supply effects in the short and medium term. With regard to the national implementation schemes, only the date of decoupling the milk premium was predicted to affect milk supply. Most of the models show an almost stable milk supply, even in the case of total decoupling. The milk quota is still binding and therefore will be fully used.

According to the current literature, it can be concluded that milk production in the EU will continue to be at quota level. Maybe higher internal consumption due to lower domestic prices will decrease EU exports and increase NZ exports. EU beef production is expected to decrease in all the relevant studies, depending on the degree of decoupling.

Chapter 2
Agricultural Policy in the European Union and New Zealand

The EU has changed significantly the way how it supports its farmers during the last 15 years. However, the absolute amount of government support to the agricultural sector has still increased in this period. NZ on the other hand presents a case study of a country moving from a highly regulated economy to one of the most deregulated in the Western World. In this chapter, the historical development of agricultural policy in the EU and NZ is summarised and the different objectives are discussed.

2.1 The common agricultural policy of the EU: History and objectives

The European Union (EU) is a supranational union of 25 Member States. It was established under that name in 1992 by the Treaty on European Union. However, many aspects of the Union existed before that date, dating back to 1951. Some milestones of European integration are shown in Table 1. It started with six countries and now after five waves of accessions the EU comprises 25 Member States. The sixth enlargement has already been decided and will take place in 2007: the accession of Bulgaria and Romania will create the EU-27.

Table 1: European milestones

Year	Event
1951	European Coal and Steel Community established: Germany, France, Italy, the Netherlands, Belgium, Luxembourg
1957	European Economic Community established (Treaty of Rome)
1962	Official birth of the CAP
1973	First Enlargement of European Community (United Kingdom, Denmark, Ireland)
1981	Second Enlargement (Greece)
1986	Third Enlargement (Spain, Portugal)
1992	Treaty on European Union signed
1995	Fourth Enlargement (Austria, Sweden, Finland)
2004	Fifth Enlargement (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, Slovenia)
2007	Sixth Enlargement (Bulgaria, Romania)

Source: Delegation of the European Commission to China, 2006 (extended)

The CAP was the first common policy of the EU and hence played a crucial role in the European integration right from its beginning. Besides the CAP, the Union currently has a common single market consisting of a customs union, a single currency (so far adopted by 12 of the 25 Member States), a Common Fisheries Policy, a Common Commercial Policy and a Common Foreign and Security Policy. This chapter reviews the development of the CAP from the beginnings until its current stage and mentions the internal and external difficulties arising from this policy.

2.1.1 After World War II, Europe needed food!

After the Second World War, many parts of the European infrastructure were damaged or destroyed and consequently agricultural production was limited. Food production could not keep up with food consumption. Europe was dependant on food imports and starvation was a serious problem in some regions. Since maintenance of adequate food supplies is essential to human wellbeing and therefore to political stability, almost all European governments at this time were seeking food market policies. These policies kept farmers producing and ensured stable food prices (Gardner, 1996:5). In addition to the provision of food, the farm sector was politically significant through its social importance: around 20 per cent of the population was working in agriculture in the 1950s.

There was also a common desire among some western European countries to establish a political and economic union. The first step towards this union was the setting up of the European Coal and Steel Community (ECSC) in 1951 by six countries (Germany, France, Italy, the Netherlands, Belgium and Luxembourg). The success of the ECSC gave rise to the establishment of the European Economic Community (EEC) in 1957 by the same six countries through the Treaty of Rome. This treaty included a chapter devoted to agriculture which made clear that "the establishment of a common market in Europe which did not include agriculture was inconceivable". (Fearne, 1997:14). The objectives of the CAP, as set out in the Treaty of Rome, are to increase agricultural productivity, to ensure a fair standard of living for the agricultural community, to stabilise markets, to assure the availability of supplies and to ensure that supplies reach consumers at reasonable prices. Though unstated in the Treaty, Gardner (1996: 17) states that "the objective was the achievement of self-sufficiency in food".

2.1.2 The early success of the CAP soon brought undesirable side-effects

From the beginnings of the CAP in 1962 until a major reform in 1992, the principle used was to support farmers through the market rather than by direct subsidies. The so called 'Common Market Organisations' (CMOs) regulated the markets of all important agricultural products. A unified market was created within the EEC and domestic agricultural products were given preference and a price advantage over imported products. An 'intervention price system' guaranteed high prices within the Community and imports of any food at less than the minimum import price were banned effectively.

The CAP succeeded quickly in reaching its initial goals: it encouraged both production and productivity, stabilised the markets, secured supplies and protected farmers from fluctuations in world markets. The problem began, however, when EU farmers began to respond to high – too high – domestic prices and to produce more than the domestic market could absorb. The consequence was a permanent accumulation of surplus production in the EU stockpiles which resulted in the famous 'butter mountains' or 'milk lakes'. In the late 1970s, the European Union switched from a net importer to a net exporter for the main commodities. Exports were only possible with the aid of export subsidies, since world market prices were much lower than the internal prices in the Community. This was very costly to the EU budget and on the other hand contributed to an undesired saturation of world markets in the surplus products.

In the early 1980s EU spending in agriculture increased exponentially. As a result, the CAP has undergone several attempts to reforms. The introduction of a milk production quota in 1984 limited the excess supply of milk and hence the export subsidies for dairy products. In 1988, the European Council agreed on a package of reform measures. Among them was the

'agricultural expenditure guideline' which limited the percentage of CAP expenditure in the overall budget. The modifications of the CAP introduced during the 1980s put some limitation on the intervention buying activities of the EU farm support authorities, but they did not really change the basic problem of overproduction. In addition to the internal difficulties, the CAP has become the main source of dispute with the EU's international trading partners since the late 1970s (Howarth, 2000). During the Uruguay Round of the GATT[1] (1986-1994) the EU got particularly under pressure by the 'Cairns Group', an interest group of 18 agricultural exporting countries (among them New Zealand). The reason was because the EU has been depressing world prices by subsidising its exports and as a consequence the prices and incomes received by farmers in these countries fall indirectly. Gardner (1996:29) describes the situation by the following:

> The CAP was, until the reforms of 1992, still none the less largely the policy designed by the EEC-6 in the 1960s. A few 1980s 'add-ons', such as quotas, budgetary 'stabilisers' and limits on intervention stockholding, gave an outward appearance of reform, but by the early 1990s the beast was still the basic money-squandering, surplus-creating and trade-distorting monster which emerged from the Franco-German alliance in the 1960s.
> (Gardner, 1996, p. 29)

2.1.3 The McSharry reforms initiate the shift from market support to direct payments

A more fundamental reform became inevitable and it was the 1992 McSharry reform which redirected the emphasis of farm support from markets to direct subsidies. The aim of this reform was to reduce the internal price of EU agricultural products, without undermining farm incomes. This was achieved by a cut in the domestic prices for cereals and beef and the introduction of direct aid payments to farmers to compensate for the impact of price cuts on farm incomes. The direct payments introduced in 1992 have been coupled to production, which means that farmers had to produce a certain crop/livestock product in order to get subsides. In the beef sector, direct payments were based on the livestock numbers, so the more cattle farmers had, the more subsidies they received. The McSharry reform made no change to the support of the dairy sector.

The McSharry reform also introduced agri-environmental measures as part of 'accompanying measures' to the reform. Hence, the objectives of the CAP have been extended, away from a sole farm supporting policy to a more comprehensive agricultural environment policy. According to the European Commission (2005a), the reform of 1992 was generally regarded as successful, with positive effects on European agriculture.

The reform of 1992 was a step in a new direction of the CAP, but it did not solve all the problems. Domestic prices of the main agricultural products were still high above world market prices and hence the problem of overproduction was not solved yet. In addition, a reform was needed in view of the expected enlargement of the EU-15 to the EU-25. An extension of the CAP of that time to the 10 new Member States would have been impossibly costly to the EU's budget, and incompatible with the EU's GATT/WTO obligations (Swinbank, 1997). The Agenda 2000 reform built on the process begun in 1992: prices were cut further and direct payments were increased in order to compensate for farmers' income

[1] GATT stands for General Agreement on Tariffs and Trade. It is the precursor to the World Trade Organization (WTO).

losses. This reform brought for the first time a price reduction in the dairy sector - the intervention prices for butter and skim milk powder were cut by 15 per cent. Coupled direct payments were introduced in the milk sector and increased in the beef and cereal sectors, respectively. Agenda 2000 was the set of reforms which not only dealt with CAP reform but also the future financing of the CAP, the structure funds, EU enlargement; and most radically it replaced the original objectives of the CAP with a set of objectives for a rural policy. Rural development has officially become the 'second pillar' of the CAP. This approach covers farming, forestry, the environment, the countryside, diversification of the rural economy, the rural quality of life, innovation in farming, new uses for agricultural products, environmental protection in rural areas, and job creation (European Commission 2005a).

2.1.4 Decoupling of direct payments exposes farmers more to market forces

The mid-term review of Agenda 2000 resulted in a new fundamental reform. The 2003 reform (also referred as the 'Luxembourg Agreement' or 'Fischler reforms') of the CAP introduced a new system of single farm payments and cut - at least partially - the link between support and production. A single farm payment (SFP) will replace most of the existing direct payments. The SFP is delivered to farmers irrespective of what and how much they produce (hence 'decoupled' from production) and it is based on historical entitlements. The main purposes of the new SFP scheme are to support farm incomes and – at the same time - to allow farmers to become more market oriented, giving them the incentives to produce for consumers' demand rather than for CAP subsidies. However, Member States could choose individually to maintain a limited link between subsidy and production within clear limits. This is a new development of the CAP towards re-nationalisation of agricultural policy in the EU.

The recent reforms of the CAP also take other concerns into account, such as food safety, animal welfare and the environment. In order to receive the SFP, farmers must maintain their land in good agricultural condition and comply with standards on public health, animal and plant health, the environment and animal welfare (cross-compliance). Further details of the implementation of the 2003 CAP reform are explained in the following chapters 2.2 and 2.3.

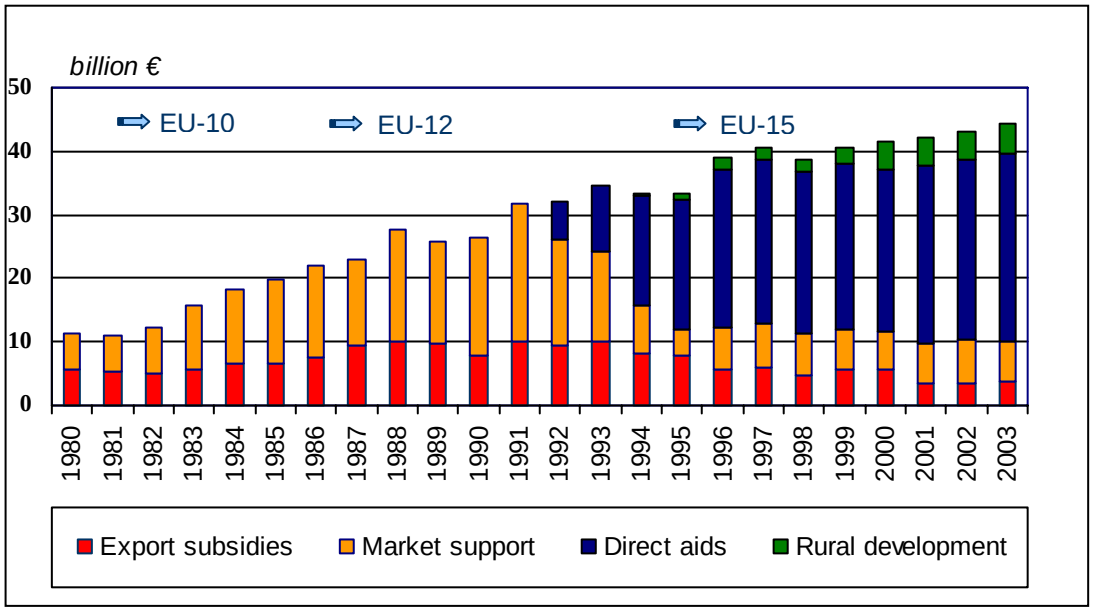
The principle of the SFP has been used for other reforms of Common Market Organisations in products which have not been affected by the 2003 reform. The '2nd wave of CAP reform' in 2004 introduced the SFP in the tobacco, hops, olive oil and cotton sectors. In the sugar sector, a reform was adopted in February 2006 and compensatory aids for sugar beet growers will be integrated in the SFP. Currently, the reform of the common market organisations in wine and fruit and vegetables is under discussion. Several reform options are to be assessed till the end of 2006, but they will be in line with the principles of the 2003 CAP reform (European Commission, 2006a).

2.2 Direct support schemes under the CAP

The breakdown of CAP expenditure from 1980 to 2003 is shown in Figure 1. It can be seen that since the mid-1990s direct payments account for the greatest part of CAP expenditure. Direct payments now contribute to 63 per cent of the total agricultural budget. In 2006, €34.8 billion are spent on direct payments (European Commission, 2006b). A major proportion of the direct payments to EU farmers is since 2005 the Single Farm Payment. In 2006, €14.6 billion will go into the Single Payment Scheme in the EU-15, which is 42 per cent of all direct payments. The European Commission (2005) estimated that in 2012 approximately 90 per cent of the budgetary transfers in the form of direct payments for the arable crops, milk, beef

and sheep sectors will be part of the single farm payment for the EU-25 as a whole. The premiums relevant for the dairy and beef sectors are described in more detail below.

Figure 1: The path of CAP expenditure from 1980 to 2003



Source: European Commission, 2005c

2.2.1 Dairy premium

The dairy premium was introduced in the Agenda 2000 reforms in order to compensate for the reductions in the intervention prices for butter and skim milk powder and the increase in the milk production quota. It was introduced as a coupled direct payment, granted per calendar year, per holding and per tonne of milk. Milk producers qualify for a dairy premium from 2004 to 2007. From 2007 on (in some Member States from 2005 on), the dairy premium will be decoupled and included in the SFP. The amount of the dairy premium is calculated by multiplying the reference quantity for milk available on the holding on 31 March of the calendar year concerned by:

- €8.15/t for the calendar year 2004,
- €16.31/t for the calendar year 2005,
- €24.49/t for the calendar year 2006 and for the following calendar years (European Commission, 2003).

2.2.2 Additional payments for milk producers

Member States can make additional payments to their producers on a yearly basis. The total amounts for each country are fixed by the European Commission and account for €1,294 million for the whole EU-15 in 2006 and 2007. Additional payments are granted as a supplementary amount per dairy premium amount as set out above.

2.2.3 Suckler-cow premiums

The suckler-cow premium is an annual premium of €200 per eligible animal per calendar year. The condition to the premium is that the farmer does not supply milk or milk products from his farm as it was introduced to promote the conversion from dairy farming to beef cattle farming. National and individual ceilings in the number of eligible animals apply. The number of animals qualifying for the suckler-cow premium also depends on the application of a stocking density. The maximum stocking density is 1.8 livestock units (LU) per farm, hectare and calendar year. Several Member States (Austria, Belgium, France, Portugal, Spain) are keeping the suckler-cow premium coupled even after the 2003 reform, whereas the other Member States include it in the SFP.

2.2.4 Additional suckler-cow premium

Member States may grant an additional national suckler-cow premium, up to a maximum of €50 per animal. Under certain circumstances, this additional premium is financed partly or completely by the Guarantee Section of the European Guidance and Guarantee Fund (EAGGF).

2.2.5 Beef slaughter premium - calves

The slaughter premium is granted on slaughter of eligible animals or their export to a third country. It amounts to €50 for calves of more than one and less than eight months age and a carcass weight up to 185 kg. Some Member States (Austria, France, Belgium, Netherlands) made use of the option to keep the slaughter premium for calves coupled.

2.2.6 Beef slaughter premium - adults

Like the slaughter premium for calves, the slaughter premium for adults is paid at slaughter or export to a third country. It amounts to €80 and is granted for bulls, steers, cows and heifers from the age of eight months. The European Commission allowed Member States to keep 40 per cent of the slaughter premium for adults (€32) coupled, the rest is included in the SFP. Austria, France, Portugal and Spain made use of this option, whereas the Netherlands keep the adult slaughter premium 100 per cent coupled.

2.2.7 Beef special premium

A farmer holding male bovine animals may qualify for a special premium, granted per calendar year and per holding, set at €210 per eligible bull and €150 per eligible steer and age bracket. The beef special premium will still remain for 75 per cent coupled in Denmark, Finland and Sweden and is included in the SFP in the other Member States.

2.2.8 Deseasonalisation premiums

Where the number of steers slaughtered in a Member State in a given year exceeds 60 per cent of the total number of male bovine animals slaughtered that year and where the number of steers slaughtered from 1 September to 30 November of a given year exceeds 35 per cent of the total number of steers slaughtered that year, producers may qualify for the

deseasonalisation premium. The premium lies between €18.11 and €72.45, depending on the time of the year.

2.2.9 Beef extensification premium

Farmers receiving the beef special premium and/or the suckler-cow premium may qualify for an extensification payment. It is €100 per special premium and suckler-cow premium granted, provided that in respect of the calendar year concerned the stocking density on the holding concerned is less than or equal to 1.4 livestock units (LU) per hectare.

2.2.10 Additional payments to beef producers

Member States are allowed to make additional payments to farmers, according to objective criteria including the relevant production structures and conditions, in order to ensure equal treatment between farmers and to avoid market and competition distortions. Additional payments may be made in the form of headage payments (per male bovine animal, suckler-cow, dairy cow or heifer, respectively) and/or area payments (per hectare of permanent pasture) and are subject to national ceilings.

In addition to the direct payments in the dairy and beef sectors, support schemes for sheep and goats, arable crops, rice, starch potatoes, grain legumes, protein crops, seeds, olive oil, nuts and energy crops have been affected by the 2003 reform of the CAP.

2.3 Implementation of the 2003 CAP reform

The Fischler reforms affected both the milk and the beef sector. The milk production quota was increased step by step from 118,392,387 to 120,504,975 tons in 2007. The intervention price for butter was reduced by 25 per cent (additional 10 per cent to the Agenda 2000 decisions) and the intervention price for skim milk powder was cut by 15 per cent. The intervention price for butter will be €2,464 per ton from July 2007 and for skim milk powder €1,747 from July 2006. The dairy premium has been increased from €17.24 per ton to €24.49 per ton from 2006 (European Commission, 2003b). Changes in the beef sector result from the decoupling of most direct payments which were previously explained.

As a new element the 2003 CAP reform has provided a large space for national initiatives (Halmai & Elekes, 2005). The following elements of the reform fell within national jurisdiction:

- possibility of partial decoupling
- selection of the SFP calculation model
- date of introduction (between 2005 and 2007)
- re-allocation of subsidies (modulation)
- application of cross-compliance

The possibility of partial decoupling was provided in order to avoid abandonment of production. Member States could choose to maintain a limited link between subsidy and production under well defined conditions and within clear limits. Germany, Ireland, Italy, Luxembourg and the United Kingdom chose to maximise, while France chose to minimise the degree of decoupling. The options chosen by three Member States (United Kingdom, Austria, and France) are shown in Table 2. The United Kingdom was selected as an example for the highest degree of decoupling - contrarily to France which opted for the lowest degree of decoupling. Austria lies somewhere in between with only premiums in the beef sector remaining coupled.

Table 2: National implementation of the 2003 CAP reform in selected countries

Country	Premiums that remain coupled
United Kingdom	None
Austria	Suckler cow premium (100 per cent) Slaughter premium calves (100 per cent) Slaughter premium adults (40 per cent)
France	Suckler cow premium (100 per cent) Slaughter premium calves (100 per cent) Slaughter premium adults (40 per cent) Ewe premium (50 per cent) Arable crops area payment (25 per cent) Outhermost regions (100 per cent) Seed aid (some species)

Source: European Commission, 2006c

The European Commission proposed different models to calculate the SFP, including a model based on historic data, a regional model and a hybrid system. The majority of Member States will base the SFP on farm level historical entitlements, with Denmark, Finland, Germany, Luxembourg, Sweden and the United Kingdom using a mix of both farm level historical and regionalised payments. In case of the United Kingdom, the individual countries (England, Scotland, Wales and Northern Ireland) have each chosen a slightly different option. Entitlements for single farm payments are calculated on the basis of direct payments received in the reference period 2000-2002.

The majority of EU-15 countries started to implement the single payment scheme in 2005, with the rest (Finland, France, Greece, the Netherlands and Spain) commencing in 2006. The new Member States (except Slovenia and Malta) implemented single area payment schemes in 2004, providing a flat rate averaging EUR 48 per hectare for all agricultural land (European Commission, 2006c).

Member States also had to decide on the introduction of a national modulation. Modulation is the reduction of direct payments and re-allocation of subsidies to rural development measures. The obligatory modulation was 3 per cent in 2005, 4 per cent in 2006 and will be 5 per cent annually until 2012. This regulation shows the efforts to redirect the CAP from only farm support towards a more comprehensive rural development policy.

Furthermore, Member States play the leading role in ensuring cross-compliance is applied. Cross-compliance must be respected by farmers in two ways:

- Statutory management requirements (SMRs): These are standards set-up in accordance with 18 EU Directives and Regulations[2] relating to the protection of environment; public, animal and plant health, and animal welfare.

- Good agricultural and environmental condition (GAEC): These are standards to be established by the Member States and are intended to avoid the abandonment of agricultural land and its environmental consequences. This is an obligatory minimum requirement for all farmers to attain. It should not be confused with the higher standards involved in voluntary agri-environment schemes (within rural development measures), where farmers may receive a payment for providing environmental services which go beyond basic mandatory legal standards.

Failure by farmers to fulfil these conditions can result in deductions from, or complete cancellation of, direct payments. After a review of the cross-compliance regulations in England (Defra, 2006), Austria (AMA, 2006) and France (Menet & Saunders, 2006) it can be concluded that the regulations are basically very similar across the Member States and most of them have already been part of existing law in all Member States. Hence, farmers do not have to do anything different in order to comply and it can be assumed that cross-compliance does not really have an effect on production. Therefore the introduction of cross-compliance is not included here in the modelling of the impacts of the 2003 CAP reform.

2.4 The agricultural policy in New Zealand: History and objectives

New Zealand presents a case study of a country moving from a highly regulated economy to one of the most deregulated in the Western World. The New Zealand experience shows that liberalisation of agricultural trade is feasible and brings economic benefits. Johnson (2000) argues that a New Zealand style liberalisation of agriculture would be beneficial in Europe as well. This chapter summarises the developments in agricultural policy in New Zealand after the Second World War until today and stresses its objectives, which differ from those of the European Union.

2.4.1 Post World War II: Agricultural exports make New Zealand rich

New Zealand emerged from the Second World War with a highly regulated economy "to an extent that was unusual amongst the relatively wealthy countries" (Rayner, 1990:15). At this time it was thought that the low level of unemployment and economic growth was directly attributable to the policy of protectionism. In the early 1950s, New Zealand was one of the richest countries in the world. Its Gross Domestic Product (GDP) per capita was exceeded only by Switzerland (Bell & Elliott, 2006). In a world facing major shortages of agricultural goods, New Zealand's wealth was mainly based on the sale of agricultural commodities to Great Britain. The British market absorbed all the produce New Zealand could send, with guaranteed access at good prices (Bell & Elliott, 2006). Under these safe market conditions, farming flourished and New Zealand built a high standard of living without the need to face up to international market prices or competition.

[2] Listed in Annex III of Regulation No. 1782/2003

In the 1960s, the high standard of living enjoyed in the 1950s suffered as the global situation became less favourable for New Zealand and its exports. At this time, the new Common Agricultural Policy in the European Economic Community showed its first effects. Advancing agricultural technology, combined with increasing agricultural subsidies to producers in developed economies and reduced market access, led to falling world prices, particularly for the food products that New Zealand exported. Agricultural protectionism overseas meant that the terms of trade facing New Zealand exporters were steadily worsening.

2.4.2 Britain's EU accession leads to a crises in New Zealand

In 1973 the United Kingdom joined the European Economic Community (EEC). This marked a major turning point for the New Zealand economy as New Zealand lost its unrestricted guaranteed access to the British market for agricultural commodities. In joining the EEC, the United Kingdom adopted the Common Agricultural Policy (CAP) and hence the principle of 'community preference'. Supplies from within the Community had to be given preference in the market over those from outside the EEC and external trade barriers were applied to New Zealand like to any other non-member country. However, New Zealand received transitional entry preference for butter, cheese and sheepmeat under Protocol 18 of the United Kingdom Treaty of Accession. This preferred market access has been progressively reduced: in the butter market, for example, in 1965, 93 per cent of the exported New Zealand butter was shipped to the UK, while by 1988 this was reduced to 51 per cent (Lattimore & Rae, 1990). As a consequence, New Zealand exporters were forced to look for alternative markets, but these markets did not provide the same returns as the British market. The result of the decreasing export earnings in combination with increasing import expenditure (among others due to the petrol shocks at this time) was a serious deterioration of New Zealand's balance of payments. The policy response was to encourage farmers to increase production for exports.

In the 1970s, a number of new farm support programmes were created and already existing subsidies were increased. These production development programmes involved direct transfer payments to the farm sector. They were of three types: investment and development, income support and stabilisation, and input subsidies. Total assistance or transfers to the pastoral sector rose to 33 per cent of the value of GDP generated in the 1980-84 period (Johnson, 2000:21). In 1983, the producer support equivalent (PSE) measure for New Zealand agriculture peaked at 35 per cent (Rae & Blandford, 2006). For a comparison, the PSE in the European Union at the time was 34 per cent (OECD, 2005). The programmes did increase production, but they were not sustainable. The increased output was in some cases worth less than the cost of production and processing (Bell & Elliott, 2006). In the early 1980s the fiscal costs of assistance to agriculture rose very sharply. This was the result of a widening gap between market prices for some agricultural commodities and the prices guaranteed by stabilisation programmes. The increase in subsidies to agriculture was so important that they reached close to 40 per cent of the budget deficit in 1985 (Gouin et al., 1994:15).

2.4.3 Crises in the whole economy triggers agricultural policy reform

To sustain the standard of living that New Zealanders had become used to during the 1950s and early 1960s, the government had begun a programme of borrowing on international markets until the situation became unsustainable. At the beginning of reforms in 1984, the overseas public debt reached 24 per cent of GDP, and "promised to increase indefinitely" (Gouin et al., 1994:12). In 1984, circumstances changed abruptly at the change of Government. The economic and budgetary crises led to a total reform in government

intervention in all economic activities. Due to its importance in the New Zealand economy, the farm sector was at the front line of the economic reform.

During the reforms starting in 1984, assistance to agriculture was rapidly withdrawn. Farmers had benefited most from the supplementary minimum prices (SMP) scheme, which operated similarly to a direct payment or export subsidy, depending on the commodity. This scheme was eliminated. Most other programs were phased out by the early 1990s and the PSE fell below 5 per cent. Now, the level of producer support is the lowest across OECD members – the PSE was 2 per cent in 2002-04. Prices received by farmers have been aligned with those on the world market since 1988. Payments are only provided for pest control or relief against climate disasters, but there is no direct support to agriculture from the government (OECD, 2005). The major remaining area subject to marketing controls is the export monopolies of producer boards, but here "efforts to deregulate the producer and marketing boards continued" (OECD, 2005:61). Nevertheless, in the current Doha round of the WTO negotiations, the EU keeps pressure on New Zealand over its dairy export monopoly (Agra Europe, 2006).

2.4.4 Low support makes New Zealand agriculture very efficient and competitive

According to Johnson (2000:16) "the most significant change (in the New Zealand agricultural economy) between 1960 and 1998 has been the complete re-alignment of market destinations". In 1960, the United Kingdom (UK) was buying 53 per cent of all merchandise exports from New Zealand, whereas in 1999, the UK was only taking 6.2 per cent of total merchandise exports. The adjustment was harsh and complicated for New Zealand. However, new markets were developed, new products were found and New Zealand farmers were "encouraged to stand on their own feet and face the world" (Johnson, 2000:16). This made New Zealand more competitive in trade relationships with other countries and encouraged a set of economic reforms. New Zealand agriculture has become "a market driven export oriented sector" (OECD, 2005:61). Now, farmers in New Zealand are using fewer inputs, they have increased the efficiency of the farming sector and hence become extremely internationally competitive. Farmers indicate that they would rather farm under the current situation than in the previous situation with government support (Bell & Elliott, 2006).

New Zealand domestic agricultural policy efforts are addressing environmental and food safety issues. Parallel to the agricultural policy reform, environmental protection programmes have been introduced on a 'polluter pays' basis so that the chance of renewed subsidisation of production is largely avoided and the costs of such programmes fall on those who created the externalities. Apart from special programmes to address severe land degradation in two regions of the country, and diminishing number of regional council grant programmes for soil conservation, there are no government subsidies to farmers to comply with environmental standards (MAF, 2006a).

Nowadays in New Zealand, agriculture contributes nearly 9 per cent of GDP and 8 per cent of employment (OECD, 2005). A large proportion of agricultural output is exported. Exports derived from farming used to contribute to 90 per cent of total exports in the 1950s (Johnson, 2000). Agriculture still is New Zealand's main export sector, accounting for over 60 per cent of merchandise exports, with dairy and meat exports comprising more than half of this (WTO, 2003). This level is high compared with that in most OECD countries. New Zealand still continues to live beyond its means: the internal balance of payment deficit continues at 3 per cent of GDP, and the net public overseas deficit is about 50 per cent of GDP (Bell & Elliott, 2006). The International Monetary Fund (2006) ranks New Zealand on the 27th position in its World Economic Outlook Database which lists countries by GDP (at purchasing power

parity) per capita. Rayner (1990:20) argues that "one of the root causes of the economic difficulty New Zealand faces is beyond its control and almost beyond its ability to influence". He thinks about the agricultural subsidies in many other countries and argues that "a liberalisation of world agricultural trade would be highly beneficial to New Zealand, however little can be done to advance this cause save through exerting what influence New Zealand has in organisations such as the GATT and OECD".

2.5 CAP and New Zealand – some conclusions

The importance of the agricultural sector in the whole economy differs significantly between the EU and NZ. In the EU, the agricultural sector generates 2 per cent of the gross domestic product (GDP) and contributes 3.8 per cent of total employment (OECD, 2005). The share of agricultural products in the EU's total exports of goods is 6.2 per cent (European Commission, 2006d). On the other hand, agriculture accounts for nearly 9 per cent of GDP, 8 per cent of employment and 43 per cent of total exports in NZ (OECD, 2005). For NZ, agriculture is the most important export earner, whereas the EU generates most of its income from other sectors and hence can transfer money in form of subsidies to the agricultural sector.

The 'European model of agriculture' suggests that European farming provides multifunctional, non-market goods and services. The term 'multifunctionality' refers to any unpriced side-benefits additional to the production of food and fibre. Europeans emphasise the social functions of providing environmental and amenity goods (such as scenic landscapes, wildlife and biodiversity) and sustaining rural communities. (Latacz-Lohmann & Hodge, 2001). The rural environment in Europe is a 'lived-in' environment for the vast, non-agricultural, majority of the population that is a product of particular agricultural production systems. Landscapes and habitats have coevolved with agricultural systems and the communities that have depended on them. Maintaining the flow of amenity benefits will require payments to agriculture in order to maintain the particular processes that support the environmental quality (Latacz-Lohmann & Hodge, 2003).

On the other hand, in NZ agriculture is 'a market driven export-oriented sector' (OECD, 2005) and seen as a business like other industries. Farm support in NZ before the free-market reforms in the 1980s had the objective to increase export revenues. These reforms have been triggered by a crises in the whole economy and not mainly by a philosophy of not supporting the agricultural sector. New Zealanders may have a preference for a wilderness landscape and therefore the European view of a cultural landscape and a lived-in rural environment as an amenity of everyday life for the non-agricultural majority of the population may sound strange for them. According to the New Zealand Official Yearbook 2002, NZ is one of the most urbanised countries in the world, with 85.7 per cent of its population living in urban areas. In contrast, the EU has a lower level of urbanisation of 75 per cent (Statistics New Zealand, 2006). Agriculture is the basis for maintaining the rural communities where one quarter of the EU population lives.

EU citizens have high expectations towards environmental quality, food safety and animal welfare. In a dense populated region like Europe it is much more difficult to maintain the same level of environmental quality than in a low populated island like New Zealand. Hence, environmental regulations play an important role in EU agriculture – more than in most other regions of the world. This, among other factors, raises the production costs in the EU. States lose a comparative advantage in trade by stringent environmental regulations (Managi &

Karemera, 2005). Agricultural support can be seen to neutralise the loss in comparative advantage for European farmers.

The NZ experience has shown that an important reduction of state support to the farm sector is possible without causing the rural economy to collapse. However, farm structures have changed dramatically towards much bigger farms than in the EU. For example, an average dairy farm holds 300 cows in NZ, but only 30-60 cows in the EU. Farm structure in NZ has always been larger than in the EU because of the different historical development.

The social impact of restructuring due to a liberalisation in the agricultural sector in the EU can be expected to be much higher than in NZ. There are 70,000 farms in NZ (Statistics New Zealand, 2003), compared to 5.5 million farms in the EU-15, plus around 4 million in the EU-25 (European Economic and Social Committee, 2004). Additionally, it is politically much more feasible to liberalise a sector in a single country with 4 million inhabitants than in a union of 25 countries with a population of 450 million. Furthermore, regional differences within the EU are very large: in the United Kingdom, 1.4 per cent of the working population is employed in agriculture, whereas in Poland agriculture represents the main activity of 17.4 per cent of workers (Eurostat, 2006). A liberalisation in the agricultural sector would have different impacts on different countries and is therefore politically difficult.

Chapter 3
Dairy and Beef Sectors in the EU and NZ

Milk production is the main farming activity in almost all countries of the EU individually and in the EU as a whole - where it accounts for 18.4 per cent of the total value of agricultural production. The importance of the milk sector within EU agriculture is even more apparent when compared with the closely related sector of beef cattle farming which accounts for 11.9 per cent of the total value of agricultural production and is the second largest contributor (European Commission, 2004). In NZ, like in the EU, milk production is the main contributor to the total value of agricultural output. Beef cattle farming is the third largest sector, overtopped only by milk production and horticulture (Statistics New Zealand, 1996). Production of milk and beef in the EU is mainly aimed for the domestic market and 'surpluses' are exported with the help of export subsidies, whereas in NZ around 90 per cent of dairy and beef products are produced for export. The structures of milk and beef production differ considerably between the EU and NZ. In the following section these differences are explained further.

3.1 Main characteristics of the dairy sector in the EU and NZ

In both the EU and NZ, the number of dairy farms has been falling during the past decades, but the average farm and herd size has increased. Nevertheless, there are considerable structural differences in the dairy sector. NZ has always had larger farms than the EU and structural adjustment proceeds faster in NZ because in the EU it is slowed down by policy measures. In the EU, there are vast differences between the Member States. In Ireland, the United Kingdom, the Netherlands and Denmark the typical herd size is 30-60 cows, as compared to only 10-20 cows in Austria (Hofstetter, 2005). The average milk production per cow in the EU is 6,248 kg per year (FAPRI, 2005). The average NZ dairy farm in 2002 was 103 hectares, milking 271 cows which each produced 3,679 litres of milk (MAF, 2006b). A comparison of these figures is given in Table 3.

Milk production in the EU usually occurs all year round. There are different production systems, but generally cows are held in stables where they are fed with silage, hay, green fodder and concentrated feed. 'High input – high output' systems are prevalent in which milk is produced at costs of 28.9 US cents per kg in the average (Fonterra, 2005). Contrarily, the vast majority of New Zealand dairy herds (97 per cent) supply milk seasonally for manufacturing (MAF, 2006b). Cows are milked in spring, summer and autumn, but dried off in winter when pasture production is lower. The remaining three percent of the herds supply milk year-round for the domestic liquid milk industry. The seasonal milk production system relies predominantly on highly productive, rotationally grazed pasture and herds of high genetic merit. It is this system that enables farmers to produce milk substantially below average world costs, giving NZ its advantage over competitors world-wide. Average milk production costs in NZ amount to 13.5 US cents per kg (Fonterra, 2005). The warm climate and productive pastures enable herds to graze in pasture year-round, thus avoiding the need for indoor housing and expensive feed supplements (MAF, 2006b).

NZ has a strong comparative advantage in dairy production and processing. The sector competes strongly, internally, for economic resources. Dairying's position has been

strengthened in this regard by the deregulation of the economy as a whole since 1984. Agricultural subsidies prior to that date tended to favour sheep production over dairying and earlier industry policy tended to favour manufacturing over natural resource/based production. (Lattimore & Amor, 1998). Today, milk in NZ is produced without agricultural subsidies: the OECD's Producer Support Estimate (PSE) is lower than 1 per cent (OECD, 2005), which means that less than 1 per cent of gross farm receipts are derived from government support policies. The PSE for the milk sector in the EU is 40 per cent and is higher than in most other agricultural sectors. In the EU, dairy farming benefits relatively more from agricultural support compared to other agricultural sectors.

Table 3: Typical herd size, average milk production per cow, milk production costs and producer support for milk inthe European Union and New Zealand

	EU-15	NZ
Typical herd size (number of cows)	30-60	300
Milk production per cow 2004 (kg/year)	6,248	3,837
Production costs 2002 (US cents/kg)	28.9	13.5
Production costs 2003 (€/100 kg)	28.6	14.4
Producer support estimate (per cent)	40	<1

Sources: Hofstetter (2005), FAPRI (2005), Fonterra (2005) and ZMP (2004)

3.2 International trade in dairy products

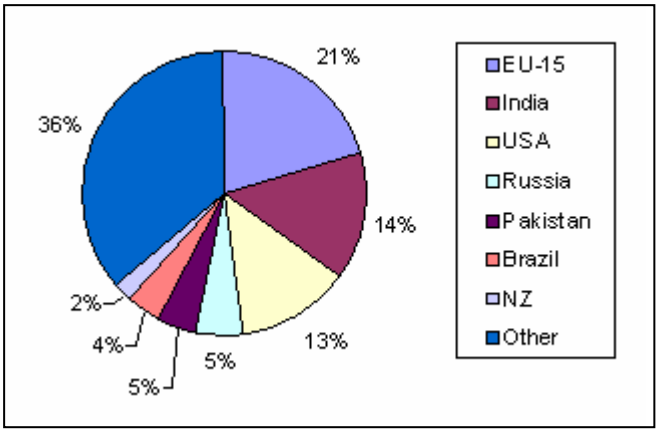
World-wide, dairy is one of the most highly supported of all agricultural industries (Shaw & Love, 2001). As a result, world trade in dairy products continues to be distorted by the use of strong protectionist policies and export subsidies. The quantities of milk products entering trade are small as compared to the quantities being produced. World trade (based on exports) of dairy products takes only about 8 per cent of global dairy production (OECD, 2004b). Due to the heavy weight of fluid milk and for sanitary reasons, mainly processed dairy products are traded. The most important dairy products traded on a global scale are skimmed milk powder, whole milk powder, cheese and butter. This chapter gives an overview about the major producers, consumers and global trade flows in the dairy market and discusses in particular the trade relationship between the EU and NZ.

3.2.1 World dairy production

The world's largest dairy producers are the EU, India and USA, followed by the Russian Federation, Pakistan, Brazil, China and NZ. Figure 2 depicts the shares of the top 6 milk producers on the global production. NZ is the eighth largest producer of dairy products, accounting for 2 per cent of global production. These figures (FAO, 2006) contain the production of all types of milk (cow milk, buffalo milk, sheep milk, goat milk and camel

milk). The development of dairy production is completely different between the major producers. In the EU, production remained stagnant in the period from 1992 to 2004 (-0.1 per cent), whereas it almost tripled in China (+184 per cent) and decreased by 32 per cent in the Russian Federation. In NZ, Pakistan, India and Australia the production rose by more than 50 per cent within these 12 years.

Figure 2: Shares of the top six dairy producers (+New Zealand) on world production in the year 2004



Source: FAO, 2006.

World milk production is predicted to grow at the sustained pace of 1.9 per cent on annual average up to 2010. This is driven by higher demand and a rise in prices in a number of countries. The greatest increase in milk output is forecasted in China, India, Brazil and Argentina. (European Commission, 2005).

3.2.2 World dairy consumption

The world's largest consumers of dairy products include the European Union, the United States, China, Japan, India, Brazil, the Russian Federation, Canada, Mexico and Argentina (Shaw & Love, 2001). Per capita consumption in milk products is highest in the industrialised countries Australia, USA, NZ, Canada and EU. In Japan, India and China, per capita consumption is only moderate, but due to their great population these three countries belong to the most important consumers of dairy products.

The European Commission (2005) predicts that in the medium term, global demand for dairy products will remain dominated by a strong expansion. Demand growth is projected to be strongest in Asia, Latin America and the Middle East. Also the FAO (2004) expects international demand for dairy products to continue to grow largely due to high income growth in some developing countries. Increased purchases of milk powder by countries in South East Asia – for example Thailand, the Philippines, Indonesia and Malaysia – and China, are anticipated to help meet rising domestic demand as income growth continues rapidly in these countries.

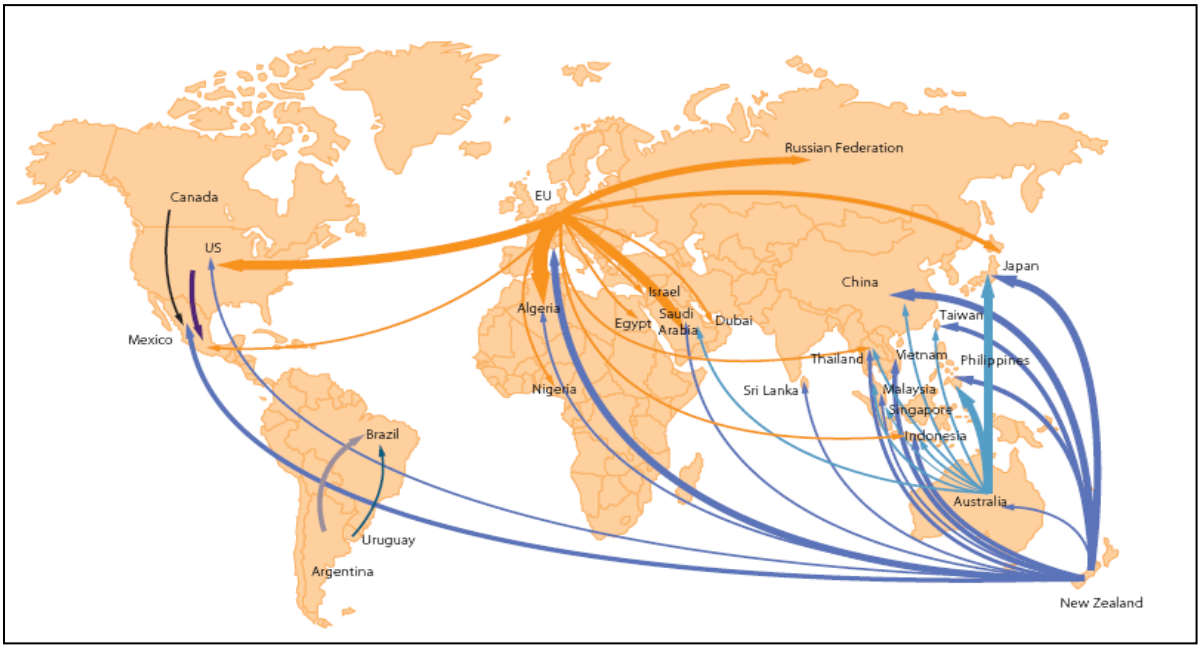
3.2.3 World trade in dairy

World trade, particularly exports, are dominated by only a few industrial countries (EU, NZ, Australia, and USA). The leading importers are China, EU, Mexico, USA and the Russian

Federation. In Figure 3, the major dairy trade flows are shown. The most significant global players in dairy trade are the EU (orange arrows), NZ (dark blue arrows) and Australia (light blue arrows).

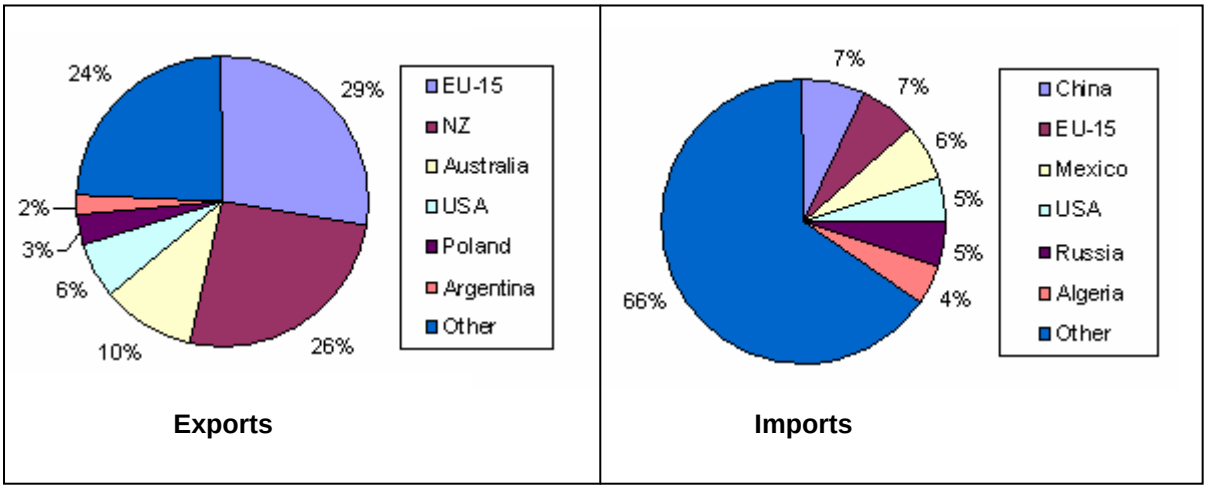
There are two main dairy exporters on the world dairy market: the EU and NZ. Figure 4 depicts the shares of the top 6 dairy exporters on world trade in 2003 and it illustrates the dominant position of the EU and NZ. In 2003, the EU-15 exported 12.4 million tons milk equivalent, which is 29 per cent of global exports. NZ contributed to 26 per cent of global exports (11.4 million tons). In the third position is Australia, exporting 4.5 million tons. However, this is much less than NZ's export volume; taking a share of 10 per cent.

Figure 3: Major diary trade flows (>= 250,000 milk equivalents)



Source: Fonterra, 2005

Figure 4: Shares of the top six dairy exporters and importers on world trade in 2003



Source: FAO, 2006

A special feature of New Zealand's and Australia's dairy market is that they export a relatively large proportion of their dairy production. EU and US exports, however, represent only a relatively small proportion of their total production. In the five year period from 1998 to 2003, NZ's exports increased by 46 per cent. The exports of the other major players in the dairy market did not experience the same rapid growth. The growth in NZ's milk production has slowed down last year due to competition for land use and rising costs (Fonterra, 2005). According to the outlook of the American Food and Agricultural Policy Research Institute (FAPRI, 2005), NZ's export supplies of dairy products are anticipated to grow by 23 per cent in the next ten years. In addition, in South America, export availabilities are expanding. For example, exports of whole milk powder from Argentina may rise over 70 per cent this year (FAO, 2005). In the EU, dairy production is stagnant because of the milk production quota. The EU's exports are subsidised, otherwise they could not be sold on world markets because of high production costs in Europe. Nonetheless, as EU exports form a relatively large proportion of world exports, any reduction in the volume of subsidised exports by the European Union may have a significant effect on world dairy trade (Shaw & Love, 2001).

The demand for imports on the dairy market is more distributed between different countries than the export requirements. Figure 4 shows that there is no dominant player on the import side like the EU and NZ on the export side of the market. The largest importer is China, followed by the EU. Other important dairy importing countries are Mexico, USA, Russian Federation, Algeria, Philippines, Japan, Saudi Arabia and Thailand. The FAO (2004) predicts dairy imports to rise particularly in some densely populated Asian countries where income growth rises rapidly. Income growth causes consumer preferences to change and leads to an increase in the demand for dairy products.

3.2.4 EU Trade Restrictions

The internal prices for milk in the EU are maintained at well above the milk price equivalent for internationally traded dairy products. In combination with the high internal prices there are import restrictions, a system of intervention buying and export subsidies. Quotas have been applied to milk production since 1984, in an attempt to control the production surpluses generated by high internal prices. In the past (before 1994), restrictive measures on imports consisted mainly of levies, which barred the entry of all dairy products except for quoted quantities of New Zealand butter and some specified cheeses from a number of countries (Shaw & Love, 2001). As a result of the WTO Agreement on Agriculture, the variable levies were converted to tariffs and imports of butter and cheese were made subject to tariff-rate quotas. The above-quota tariffs, however, are that high, that in reality imports will remain restricted to the in-quota amounts.

NZ enjoys a preferential trade agreement with the EU concerning butter and cheese trade. This agreement dates back to the 1973 entry of the United Kingdom to the European Economic Community. In order to limit the adverse economic consequences for NZ (and especially to its dairy industry), a transitional agreement was made which allowed the import of 125,000 tons of NZ butter and 68,580 tons of cheese into the European Economic Community to a preferred tariff (McMahon, 1990). This preferred market access has been progressively reduced, but increased again to 76,667 tons of butter in 1995 as a result of the WTO trade negotiations (European Commission, 1999). In the context of the enlargement of the EU in 2004 this amount was renegotiated and is fixed at 77,402 tons (Fairfax New Zealand Ltd, 2005). The reduced in-quota tariff for NZ butter is €868.8/ton (European

Commission, 1999). Considering a world market price of €1,620[3] per ton and a domestic EU price of €3,052[4] per ton, there is still a price gap of €563 per ton (including the tariff). Multiplying this price difference by the amount of the quota leads to a calculated quota rent of €43.6 million. This quota rent is obtained by NZ's dairy company Fonterra, which has the exclusive quota rights. Currently, the NZ butter quota is under discussion again and the reason is explained in the next paragraph.

3.2.5 New Zealand Dairy Board

The New Zealand Dairy Board was founded in 1944 (Gilmour, 1992). It was a single desk monopoly on exports of dairy products and was ended with the merger of NZ's two largest dairy processing companies, the New Zealand Dairy Group and Kiwi Co-operative Dairies, and the formation of the Fonterra Co-operative Group in 2001. Before 2001, different dairy processing co-operatives competed in the domestic market but all exports were managed by the New Zealand Dairy Board. Today 95 per cent of NZ dairy farmers belong to the Fonterra co-operative and it collects 97 per cent of NZ milk production (Fonterra, 2006). The company retains its role as NZ's main exporter of dairy products but no longer has a statutory export monopoly (WTO, 2003). However, the monopoly still exists because Fonterra currently has exclusive rights to the dairy quota of the world's most profitable markets, namely the EU, Japan, the United States and Canada (Agra Europe, 2006). This means the above mentioned preferential butter quota to the EU is in Fonterra's hands. Fonterra operates not only as a monopolist exporter, but also as a monopolist importer. The monopoly of the import of butter was argued to discriminate against European butter importers and this is the reason why a case was brought to the European Court of Justice and EU butter imports from NZ were banned temporally in July 2006 (Woodford, 2006). Until now, Fonterra was able to capture all of the quota rent. The awaited decision by the European Court of Justice will define if European butter traders also will be entitled to a slice of the quota rent.

3.3 Main characteristics of the beef sector in the EU and NZ

The importance of the beef sector within agriculture is similar in the EU and NZ. It accounts for 11.9 per cent of the total value of agricultural production in the EU (European Commission, 2004) and 13.3 per cent in NZ (Statistics New Zealand, 1996). In Europe, beef production is to a large extent a by-product of milk production. Around two thirds of the cattle delivered for slaughter in the EU originate directly or indirectly from the dairy cow herd (European Commission, 2006e). In recent years, there has been a trend towards pure beef production rather than dairy production (Nielsen, 2001). The scale of production differs to a significant degree across countries. The average number of cattle per holding varies from around 10 in Portugal and Greece to 85 in the United Kingdom (Nielsen, 2001).

In NZ, on the other hand, beef is produced mainly on hill country farms in combination with sheep production. The majority of farms have both beef cattle and sheep, which complement each other in pasture-based grazing systems. A representative Central North Island farm is 550 effective hectares, runs 402 beef cattle and 3,565 sheep, and is owner-operated with the employment of casual labour and contractors (MAF, 2006b). All beef farms in NZ are run on low input pasture grazing systems, sometimes supplemented with hay, silage and fodder

[3] The world market price for butter in December 2004 was US$2,050 (USDA, 2005); converted with an exchange rate of 1.27 from the 1st of June 2006.
[4] Intervention price from July 2004 to June 2005 according to the European Commission (2004)

cropping. This low cost system enables NZ farmers to supply high quality pasture-fed beef to world markets at competitive prices (MAF, 2006b).

3.4 International trade in beef

Beef is produced and consumed world-wide, yet large-scale beef trade is limited to a relatively small number of countries and represents only a small proportion of total production. Only 10.1 per cent of global beef production is traded in international markets (Haldermann & Nelson, 2005). In addition to agricultural support policies, health and sanitary regulations limit international trade in beef. These regulations are aimed to prevent the spread of cattle diseases, such as foot-and-mouth disease (FMD) and bovine spongiform encephalopathy (BSE). Most beef is traded frozen, but some fresh and chilled beef is traded internationally. Trade in live cattle is significantly smaller than beef trade and tends to be limited to countries that are geographically close. This following sections give an overview of the major producers, consumers and global trade flows in the beef market and discuss in particular the trade relationship between the EU and NZ.

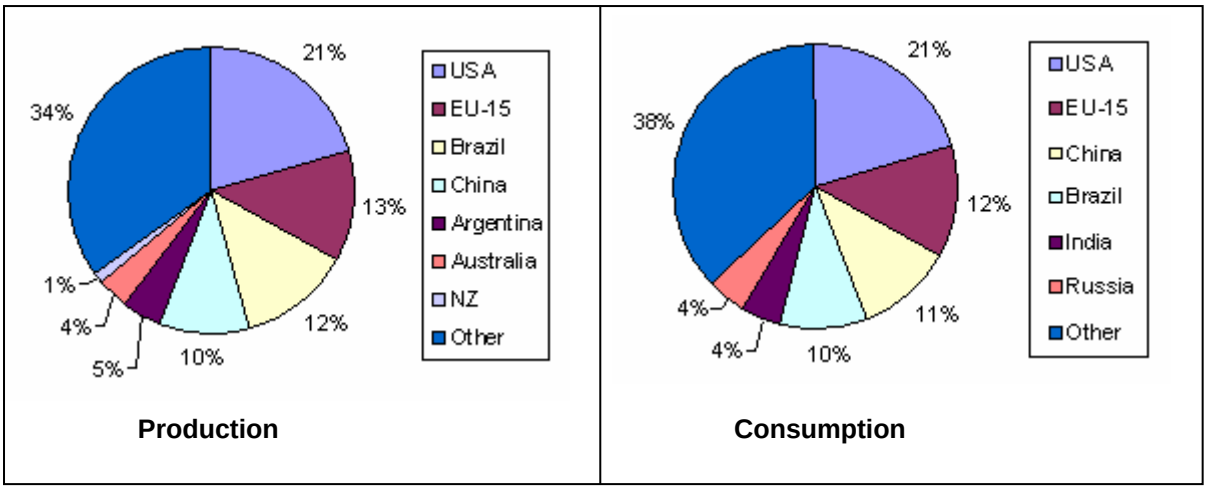
3.4.1 World beef production

The world's largest beef producers are the United States, EU, Brazil, China, Argentina and Australia (Figure 5). The EU is the world's second largest producer. In 2003, the EU countries produced more than 7 million tons of beef and accounted for 13 per cent of the world production (FAO, 2006). New Zealand takes the 12th position, producing 660,000 tons of beef in 2003 (1.1 per cent of global production). Like in the dairy sector, the 10 leading producers contribute to ¾ of global output. Global beef production has increased by 9.3 per cent from 1992 to 2003. The development of beef production is different between the major producers. In the EU, production decreased by 20 per cent in this period, whereas it increased by the same percentage in NZ. Beef production in the EU is expected to decline further as a consequence of the CAP reform and strong competition from the world market (European Commission, 2006e).

3.4.2 World beef consumption

The world's largest consumers of beef include the United States, the EU, China, Brazil, India and the Russian Federation (Figure 5). NZ takes only the 65th position in global beef consumption. Per capita beef consumption is highest in Argentina (60 kg per year) and the United States (42.8 kg per year). The average per capita beef consumption in the EU is 20 kg per year, compared to 30 kg in NZ (FAPRI, 2005). In China, per capita consumption is only 5.1 kg per year, but due to the great population it belongs to the most important consumers of beef.

Figure 5: Shares of the top six beef producers (+ New Zealand) and consumers on world production and consumption in 2003



Source: FAO, 2006

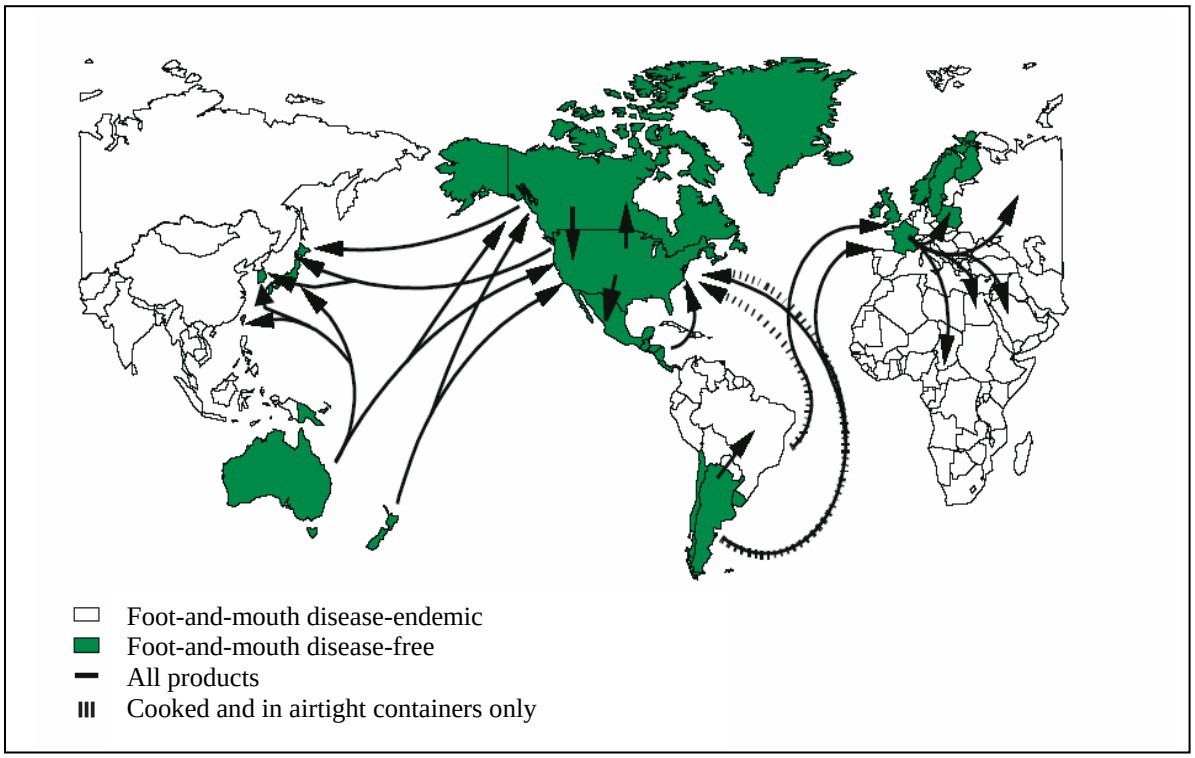
3.4.3 World trade in beef

Most beef trade originates from only a few countries. World trade in beef on the export side is dominated by Australia (19 per cent), USA (18 per cent) and Brazil (17 per cent). These three countries accounted for more than half of the beef supply on international markets in 2003. NZ is the fourth largest beef exporter, contributing to 8 per cent of global exports (Figure 7). The major beef importer is the USA, accounting for 22 per cent of world imports, followed by Japan, the Russian Federation, EU, South Korea and Mexico.

The EU used to be a major beef net exporter in the 1990s and has been self-sufficient with beef until it became a net beef importer in 2003. This beef deficit is expected to increase in the coming years, as European beef production is declining and consumption expected to remain stable (Polet, 2005).

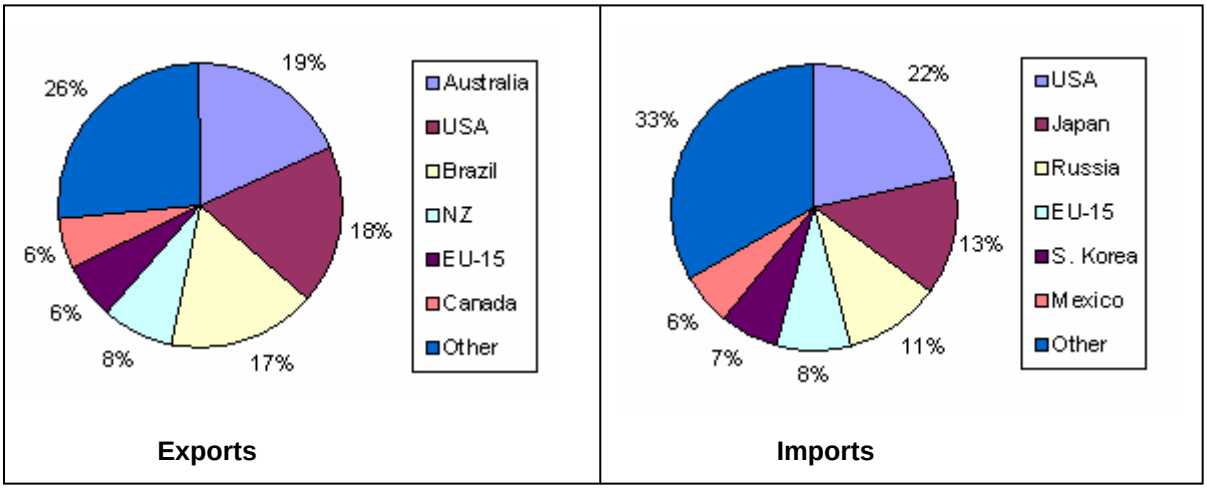
In Figure 6, the major beef trade flows are shown. The green coloured countries have been regarded foot-and-mouth disease-free in 1997. For sanitary reasons the USA put restrictions on imports from Argentina and Brazil and only cooked beef could be imported from these countries. Sanitary and phytosanitary measures are now the most significant barriers to international meat trade. In 2004, for example, confirmed BSE cases in the United States and Canada and resulting trade restrictions reduced world beef trade by 0.6 per cent (FAPRI, 2005).

Figure 6: Major beef trade flows



Source: USDA, 1997

Figure 7: Shares of the top six beef exporters and importers in 2003



Source: FAO, 2006

3.4.4 EU trade restrictions

The domestic prices for beef in the EU have been reduced significantly since 1992, but are still higher than world market prices. Like in the milk sector, the system of market price support includes import tariffs, export subsidies and intervention prices. The main part of meat from non-EU countries is imported via bilateral preference agreements at no or reduced tariffs (Nielsen, 2001). NZ has only a small quota of 300 tons for a preferential tariff of 20 per

cent of the beef price. High-quality beef cuts are also imported into the EU at the high above-quota tariff rate (12.8 per cent + €303.4/100 kg for fresh deboned and 12.8 per cent + €221.1/100 kg for frozen deboned beef). These imports originate mainly from Brazil (Polet, 2005).

3.4.5 New Zealand Meat Board

The New Zealand Meat Board was established in 1922. It was formerly notified to the WTO as a State Trading Enterprise (STE) but due to legislative changes (Meat Board Act 1997) it is no longer considered to be a STE (WTO, 2003). Now known as Meat New Zealand, it is a non-trading board that provides services such as research and development and marketing to farmers. There are 110 companies in NZ with export licenses for meat (MAF, 2006b). NZ beef exports are still dominated by frozen manufacturing beef exports to North America, but other markets are growing in importance. Asian markets, in particular, are looking for young, tender, grass-fed beef. NZ's exports of beef and veal are subject to tariff-rate quotas in some of its main markets, including the European Union, Canada, Japan, and the United States. These quotas are currently allocated by Meat New Zealand.

Chapter 4
Methodology and Scenario Descriptions

The implications of the Single Farm Payment in the European Union on New Zealand dairy and beef trade will be assessed using an international trade model. Basically, there are two methods that are used for modelling international trade with a focus on the agricultural sector. These are the economy-wide general equilibrium (GE) and partial-economy partial equilibrium (PE) models. The main objective of both frameworks is to determine the equilibrium prices and quantities on sets of markets, which are subject to various policy shocks. An agriculture focused GE model analyses the interactions both within the agricultural sector and with the other sectors of the economy. In addition, a GE framework also analyses the interactions with the factor markets. An agriculture focused PE model on the other hand, analyses the interactions within the agricultural sector only without considering the linkages with the rest of economy. PE frameworks integrate technical change, population growth and income exogenously, while these variables are generally derived endogenously in GE frameworks (Cagatay & Saunders, 2003).

By definition, '*a partial equilibrium model includes those markets most immediately relevant to a problem and excludes everything else*' (Roningen, 1997: 231). While this causes practical limitations of applied PE modelling, it is also the source of its basic advantage. By focusing on a very limited set of factors, applied PE models allow for relatively rapid and transparent analysis of policy issues (Francois & Hall, 1997). In the economic literature, many different partial equilibrium models can be found. Examples are the AGLINK model developed by the OECD, SWOPSIM developed by the USDA, VOMM developed by the World Bank and WFM developed by the FAO. In order to answer the research questions of interest, a PE framework (Lincoln Trade and Environment Model - LTEM) is used.

4.1 The Lincoln Trade and Environment Model (LTEM)

This description of the LTEM is based on the work from Cagatay & Saunders (2003). The LTEM is a multi-country, multi-commodity PE model focusing on the agricultural sector. It includes 17 countries, 19 agricultural commodities and 51 variables (details in Appendix Tables A1 – A3). The EU is taken as one single country which is referred to the EU-15. The dairy sector is modelled as five commodities. Raw milk is defined as the farm gate product and is then allocated to the liquid milk, butter, cheese, whole milk powder or skim milk powder markets depending upon their relative prices, subject to physical constraints. The commodities included in the model are treated as homogeneous with respect to the country of origin and destination and to the physical characteristics of the product. Therefore, commodities are perfect substitutes in consumption in international markets. Based on these assumptions, the LTEM is a non-spatial model, emphasising the net trade of commodities in each country.

The LTEM uses parameters adopted from the literature and hence is a 'synthetic' model. Interdependencies between primary and processed products and/or between substitute/ complementary products are reflected by cross-price elasticities. The model is used to quantify the price, supply, demand and net trade effects of various policy changes. The policy impacts until 2013 are derived in a comparative static fashion based on the base year of 2000.

Generally, the LTEM framework contains six behavioural equations and one economic identity for each commodity under each country. The behavioural equations are domestic supply, demand, stocks, domestic producer and consumer price functions and a trade price equation. The economic identity is the net trade equation which is equal to excess supply or demand in the domestic economy.

The model basically works by simulating the commodity based world market clearing price on the domestic quantities and prices, which may or may not be under the effect of policy changes, in each country. Excess domestic supply or demand in each country spills over onto the world market to determine world prices. The world market-clearing price is determined at the level that equilibrates the total excess demand and supply of each commodity in the world market by using a non-linear optimisation algorithm.

The price traded in the model for each country is a function of the world price and the exchange rate. The producer price is a function of the traded price and policies such as producer subsidies, separated into market support and direct payments. The producer price for raw milk is a function of the relative prices of the five types of dairy products marketed as well as policies. The dairy products marketed are butter, cheese, skim milk powder, whole milk powder and liquid milk (the latter is not traded in the model but on national level the demand and supply must be in balance). Consumer prices are similarly a function of the relative prices and any relative policies such as consumer subsidies. The quantity produced is a function of the producer price, the prices of substitute/complement commodities and purchase prices of inputs. The consumption of a certain product in turn is a function of its price, the income per head as well as the price of substitute/complement commodities.

Various unilateral and bilateral agricultural and border policies are simulated through the LTEM with some modifications to behavioural equations. The unilateral domestic and border policy changes are incorporated in the LTEM via two channels. The first channel is through the supply function which allows the simulations of direct supply-related policies such as: production quotas, land set-aside policy and acreage reduction. The second channel is the price formation equations which allow the simulation of various per unit border policies and a minimum price policy, as well as various per unit producer and consumer support and subsidy domestic and trade prices which are incorporated through the price functions. Bilateral policies such as preferential access and including trade quotas are also incorporated in the LTEM through modifications to the supply, price and net trade equations of the two countries.

The LTEM is built using a spreadsheet-based framework using Microsoft Excel software and is based on VORSIM, which evolved from SWOPSIM (Roningen et al., 1991) used to conduct analyses during the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) negotiations.

4.2 Treatment of the decoupled SFP in the model

A critical issue is whether the SFP introduced at the Fischler reforms will be treated as coupled or decoupled by farmers. Economic theory suggests that if coupled subsidies are replaced with payments that are totally decoupled from production, then production should fall to a level that would exist without any subsidies (Andersson, 2004). To date, relatively little is known about the supply inducing effects of decoupled payments. Research, as reviewed by Burfisher & Hopkins (2003) and Goodwin & Mishra (2006), has shown that even fully decoupled payments have a production inducing effect as they impact on farmers'

exposure to economic risk, their access to capital, and their expectations about the criteria for future payments. Swinbank & Tranter (2005) conclude in case of the SFP that the retention of the link between the payment and land farmed (cross-compliance) weakens the EU's argument that these payments are truly decoupled. In the following scenarios, however, it is assumed that the SFP will be treated by farmers as completely decoupled, as it is suggested in economic theory.

Direct payments are included in the LTEM as variable 'sd'. If the SFP is treated as completely decoupled, it cannot be attributed to any farming product and has no influence on production. Hence, in case of full decoupling, the direct payments in the model are set to zero.

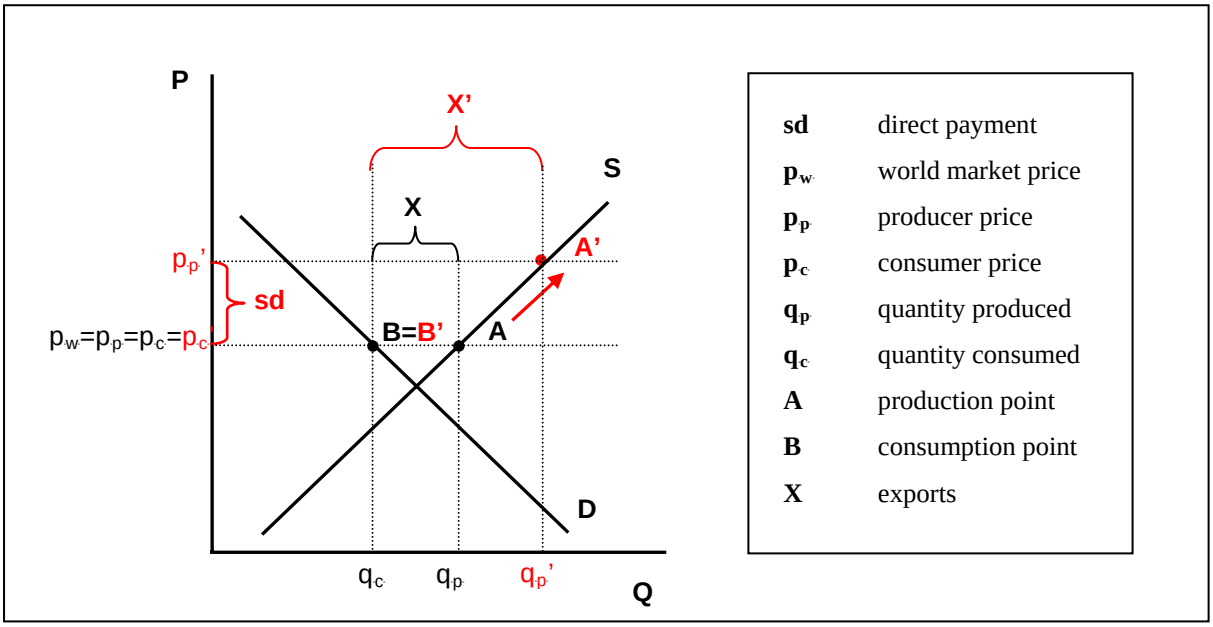
In the case that some direct payments remain still coupled to production (like in France and Austria), farmers perceive a higher producer price for the particular commodity than the market would give. The coupled suckler cow premium, for example, will be treated by beef farmers like a supplement to the beef price. Farmers base their production decisions on this higher (perceived) price. This is illustrated in Figure 8 and Figure 9, depicting the EU markets for two different commodities. Figure 8 represents the market for a product exported by the EU and Figure 9 shows a market where the EU is a net importer. In both graphs, the supply curve is depicted by the line S, the demand curve by the line D and the world market price by the line p_w.

In a situation without direct payments (or completely decoupled direct payments), the consumer price (p_c) equals the producer price (p_p). The quantity produced is q_p, whereas the quantity consumed is q_c. The difference between q_p and q_c is the amount of production exported (X in Figure 8) and the imports of the particular commodity (M in Figure 9), respectively.

If there are coupled direct payments in place, the producer incentive price is higher than the consumer price by the amount of 'sd'. This causes a movement along the supply curve from the original domestic production A to A', whereas consumption remains at B. The quantity produced increases from q_p to q_p'. In case of a commodity exported by the EU (Figure 8), the direct payment will increase the exports from X to X'. If the EU is a net importer of the commodity (Figure 9), imports will be reduced from M to M' as a result of the direct payments.

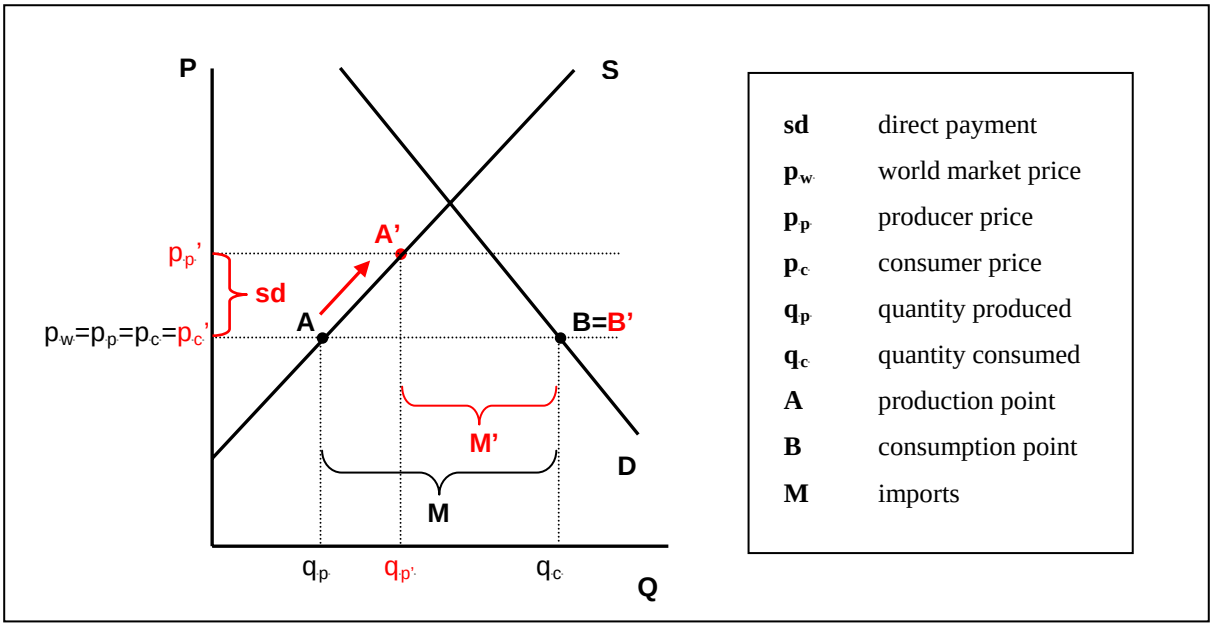
The economic effects of the 2003 CAP reform should work exactly in the opposite direction as described in Figure 8 and Figure 9. The reference scenario is the situation with direct payments in place and the other scenarios vary in different degrees of decoupling, which means a different reduction of the variable 'sd'. In the model, the variable 'sd' is included as a subsidy per unit of output ($/t). In the next chapter, it is explained how it is derived.

Figure 8: Effects of a coupled direct payment on an exporting nation



Source: own illustration, 2006.

Figure 9: Effects of a coupled direct payment on an importing nation



Source: own illustration, 2006.

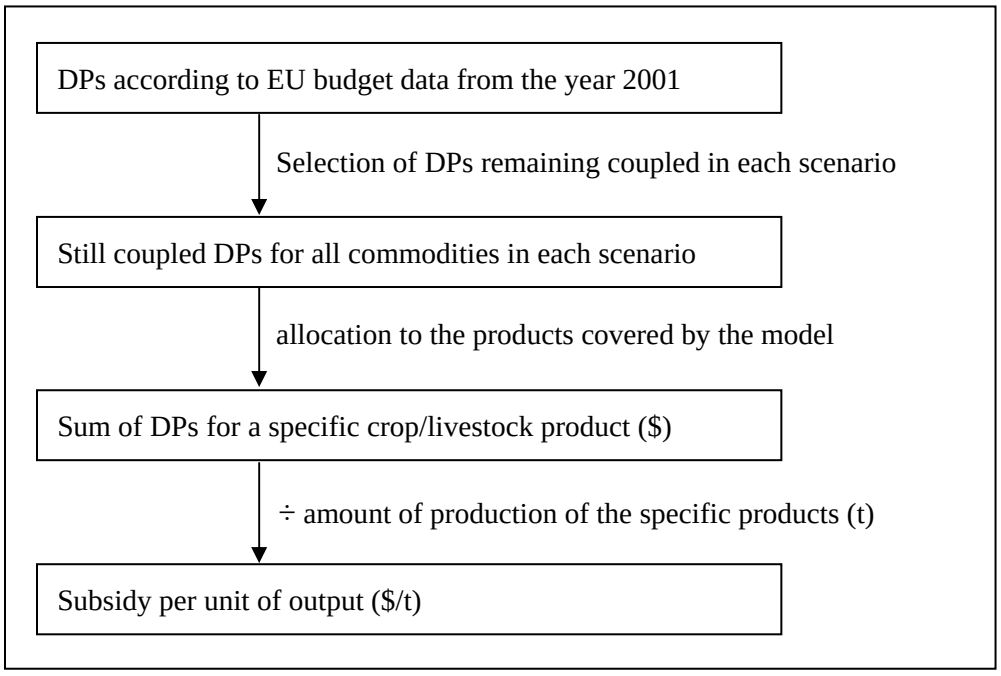
4.3 Data sources

The basic data are already incorporated in the LTEM (based on OECD, 2001) and have been updated for the base year 2000. They include production, consumption and trade data as well as more specific variables like producer market subsidy, consumer market subsidy (for all countries included in the model), EU minimum prices and sink stocks for EU dairy and meat markets.

The values for the direct payments (DPs) are taken from the EU budget data (European Commission, 2006b). Data from the year 2001 is used because this is in the middle of the reference period for the SFP from 2000-2002. The calculation of the direct payments is summarised in Figure 10. First, for each scenario the direct payments are selected, which will remain coupled even after the introduction of the SFP. Then, the direct payments for the different aid schemes are attributed to the different products covered by the LTEM. This is done by allocating the arable crops payments to wheat and coarse grains taking the ratio of area used for wheat and coarse grain production. Furthermore, payments from different schemes which benefit one commodity are added up, for example suckler cow premiums, beef slaughter premiums, male beef special premiums, and extensification payments are all attributed to beef and veal.

In order to receive a $/t value, the summarised direct payments for a specific product are divided by the amount of production in the year 2001 (FAO, 2006). The detailed data can be found in Appendix Tables A4 and A5. The currency unit used in the LTEM is US$. The exchange rate from € to US$ is assumed to be 1.0.

Figure 10: The path of calculating the direct payments (DPs) used in the different scenarios



Source: own illustration, 2006.

4.4 Scenario description

The reference scenario provides a base case from which all other policy changes can be simulated. It reflects the existing policies before the Agenda 2000 reforms and their continuation up to the target year 2013. The model includes EU minimum intervention prices for butter and skim milk powder, the internal milk production quota, export subsidies and the preferential market access for NZ butter and cheese to the EU. Direct payments from the different schemes are included as 100 per cent coupled.

Table 4 gives an overview about the scenarios. The scenarios 1 to 3 include the 2003 CAP reform and the introduction of the decoupled Single Farm Payment. They vary in the degree of decoupling, since Member States had the possibility to remain some payments partially coupled to production. Compared to the reference scenario, the milk production quota was increased by 1.8 per cent and intervention prices in butter and skim milk powder have been decreased. For comparison, scenario 4 assumes a complete liberalisation in the EU.

The English implementation scenario simulates a complete decoupling of direct payments across the EU. England decided to completely decouple all premiums which fall into the single payment scheme. Scenario 1 simulates this situation where all direct payments are given to farmers in form of the SFP and it is assumed that farmers do not use the money to subsidise production. There are no direct payments left which could be attributed to any specific agricultural commodity. Hence, farmers' behaviour is expected to be the same as if there were no direct payments.

The Austrian implementation scenario mirrors the Austrian implementation, where certain direct payments for beef remain coupled. It is the intermediate scenario, leaving the suckler cow premium and the slaughter premium for calves completely coupled and the slaughter premium for adults 40 per cent coupled. Several Member States will use the partial decoupling possibility on beef direct payments. Scenario 2 considers only these direct payments for beef, all other direct payments are left away, since they are included in the SFP and it is assumed, that farmers treat them fully decoupled.

The French implementation scenario considers the French implementation of decoupling. It models the 2003 CAP reform with the minimal decoupling in the EU. France chose to keep coupled as many payments as possible and in this scenario it is assumed that all the other Member States would have done the same. Some direct payments for cereals, beef and sheep remain coupled. Scenario 3 takes into account these direct payments, neglecting the other direct payments which are assumed to be treated as completely decoupled.

Scenario 4 illustrates the situation of a complete liberalisation in the EU. This is not a realistic scenario so far, but it should give a comparison in order to see what changes would be possible with complete liberalisation and how far the 2003 CAP reform already liberalises compared to the Agenda 2000 reform. In this scenario, all agricultural subsidies in the EU are removed, minimum prices are eliminated and the milk production quota is abolished. However, the policies in all other countries are not changed.

Table 4: Scenario assumptions about different degrees of decoupling in EU member states

Reference Scenario	Scenario 1 (England)	Scenario 2 (Austria)	Scenario 3 (France)	Scenario 4 (Liberalisation)
direct payments according to pre-Agenda 2000	no direct payments	only direct payments for beef	direct payments for cereals, beef and sheep	no agricultural subsidies at all, no minimum prices

Source: own illustration, 2006.

Chapter 5
Results and Discussion

The model uses 2000 as the base year and simulates out to 2013. It produces a range of outputs: producer and consumer prices, quantities produced, quantities consumed, quantities traded, and more. Although results are produced for all countries and commodities in the model, only selected commodities will be discussed here (dairy and beef sectors), and only for the EU and NZ. The results are presented and discussed as the differences between the reference case in 2013, and the results of the particular policy scenario simulated, in 2013. The producer returns for the EU and NZ are calculated by multiplying the quantities produced by the producer price. A summary of the results is presented in Table 5, while all results are shown in the Appendix Tables A6 and A7.

Table 5: Change in producer returns from the market (per cent) in the different scenarios, compared to the reference scenario

EU	**England**	**Austria**	**France**	**Liberalisation**
Raw milk	-0.9	-0.9	-1.0	-11.3
Beef	-21.1	-13.5	-13.4	-64.3
NZ				
Raw milk	-2.0	-2.1	-2.0	1.4
Beef	2.7	1.0	0.9	23.4

Source: Results derived from the LTEM model, 2006.

5.1 English implementation scenario

This scenario simulated a complete decoupling of direct payments across the EU, like it has been implemented in England. It predicts that milk production will increase with the increase in the quota level. Although the intervention prices for butter and skim milk powder are reduced and the compensating dairy premium is decoupled, the quota still remains binding. The increase in raw milk production also leads to an increase in the production of the processed dairy products (around 2 per cent for butter, cheese and milk powder). The producer price for raw milk falls by 2.7 per cent while the consumer price remains stable. Consumption of dairy products does not change after the reforms and hence the increased production in the EU is exported. The producer returns from the market in the EU decrease slightly in this scenario (-0.9 per cent). However, total farm incomes in the EU don't decrease since farmers in this scenario will get the Single Farm Payment. If the share of the decoupled dairy premium in the SFP is added to the market returns, EU milk producers are even better off in this scenario than in the reference scenario (3.8 per cent increase in total producer returns).

The consequence of the increased exports from the EU is a slight decrease in the producer price for milk products in NZ. NZ dairy production and exports will decrease by between 1.5 and 2.0 per cent as a result of the CAP reforms. The returns to NZ milk producers fall by 2 per cent.

This shows again the effect already noted by Saunders (2005) and Saunders & Mayrhofer (2003): the latest CAP reforms have negative impacts on the NZ dairy sector due to the rise in the internal milk production quota. The quota increase outweighs the effects of a reduction in the intervention prices for butter and skim milk powder and the decoupling of the dairy premium.

Colman & Harvey (2004) argue that the decoupling of dairy premium might encourage some producers to cease production, but it can be expected that milk supply would not be greatly affected, as other producers would take over their milk quota. This will lead to a widespread restructuring of production in many countries, but the impact on the aggregate sector figures is likely to be limited.

In contrast to the dairy sector, the effects of decoupling have a much larger impact on the beef sector. Before the 2003 reform, producers have been required to have the animal in order to claim the direct payments. This strong link encouraged production, although production effects of the payments were somewhat lessened by limits on eligible animals and other program provisions. As a result of the decoupling, the producer price for beef in the EU falls by 13.7 per cent and this causes beef production to decline by 8.6 per cent. Given reduced beef production, and with imports restricted by tariff rate quotas (TRQs), EU consumer prices for beef rise by 1.3 per cent. Consumption of beef will decrease slightly as a response to higher domestic prices. EU beef exports decrease significantly by 31.4 per cent. The producer returns from the market fall by 21.1 per cent. On the other hand, beef producers still get the Single Farm Payment and so their total income will fall only by 9.7 per cent.

Although EU beef exports decrease by over 30 per cent, this has only small implications on NZ exports (they increase by 0.4 per cent). In the beef market, both the EU and NZ are not dominant global players as in the dairy market. The decrease of beef supply to the world markets will be mainly compensated by Australian and American beef producers, who respond to higher beef prices and hence beef exports from these countries will increase. However, the producer price in NZ rises by 2.5 per cent in this scenario which leads to a 2.7 per cent increase in producer returns.

5.2 Austrian implementation scenario

In Austria, the suckler cow premium and the beef slaughter premium for calves and adults will still remain coupled to production, whereas all other direct payments will be decoupled. The results in the dairy sector are the same like in the English implementation scenario. The only difference in the implementation of the SFP in the dairy sector is that England has already decoupled the dairy premium in 2005 and Austria will wait until 2007 with the decoupling of the dairy premium. But this will not have any effect in the target year 2013.

EU beef production and exports decrease less in this scenario than in the previous one. This shows that the coupled premiums encourage maintaining a higher production level than in case of full decoupling. There is a decrease compared to the reference scenario because only a part of the beef direct payments still remains coupled. Beef production goes down by 5.7 per cent and exports decrease by 21.3 per cent. This leads to a 13.5 per cent decline in the producer returns from the market. Considering the Single Farm Payment farmers still receive, farm income will fall by 6.7 per cent. Like in the previous scenario, the implications on NZ production and exports are negligible. Nevertheless, the returns to NZ producers increase by 1.0 per cent in this scenario because of higher producer prices.

5.3 French implementation scenario

In this scenario, parts of the direct payments for beef, cereals and sheep meat remain coupled. Again, the results for the dairy sector can be compared with those from the English implementation scenario. Beef production (-5.4 per cent), exports (-20.4 per cent) and producer returns (-13.4 per cent) will fall to a similar extent as in the Austrian implementation scenario. This shows that there is no difference in EU beef production whether only beef premia stay coupled or if a combination of beef and other premia remain coupled. For NZ, there is almost no difference whether the EU Member States implement the maximum or minimum degree of decoupling: neither in the dairy nor in the beef sector.

The comparison of the French and Austrian implementation scenario with the English implementation scenario shows clearly that EU beef production will be reduced less if the maximum possible share of beef payments is kept linked to beef production. The same results are obtained by the OECD (2004a), FAPRI (2003) and European Commission (2005). The OECD estimates EU beef production to fall by 0.6 per cent by 2008 with maximum decoupling and by 0.1 per cent with minimum decoupling. Results obtained by the FAPRI forecast a 2.6 per cent decline in the full decoupling scenario and a 0.2 per cent decline in the minimum decoupling scenario. The European Commission predicts a decrease in the cattle herd as a consequence of beef meat production abandonment mainly in the Member States which have fully decoupled their cattle premiums.

5.4 Complete liberalisation scenario

The results from this scenario are expected to differ significantly to the previous ones, but in fact the implications on NZ are very small. Milk production in the EU is expected to increase, although the producer price for milk falls by 15.8 per cent as a consequence of the removal of all export subsidies, import tariffs, minimum prices and the milk production quota. Milk production exceeds the current quota level by 7.4 per cent and production of dairy products except whole milk powder increases. The returns to EU milk producers are reduced by 11.3 per cent due to the lower prices. Consumer prices for dairy products fall between 15 per cent and 20 per cent. The lower domestic market prices of dairy products boost consumption in the EU more than production is increased. The consumption of main milk products rises between 6 and 8 per cent. In the case of butter, the EU switches to a net importer. Cheese exports increase slightly, but exports in milk powder decrease significantly.

Surprisingly, the effects of a complete liberalisation in the EU on the NZ dairy sector are minimal. The producer price for milk rises in New Zealand by 1.8 per cent, but there is little response: neither production nor exports increase. However, the returns to NZ milk producers grow by 1.4 per cent.

A complete liberalisation in EU agricultural production and trade has significant effects on the NZ beef sector. In this scenario, the beef producer price in the EU decreases by almost 50 per cent, causing production to fall by 30.2 per cent. As a result, EU beef producer returns fall by 64.3 per cent. The consumer price goes down by 40 per cent, which results in a 41.4 per cent increase in consumption. The EU switches from being a big net exporter in beef to being a big net importer. World market prices rise significantly (16.7 per cent), giving NZ producers an incentive to increase production by 5.7 per cent. Finally, NZ beef exports grow by 7.6 per cent and producer returns by 23.4 per cent.

Chapter 6
Conclusions

Changes in the Common Agricultural Policy (CAP) of the EU have both direct and indirect implications on NZ. Direct impacts are related to NZ's market access into the EU, particularly under preferential arrangements. Indirect impacts include the influence the EU has on world trade in agricultural products, especially in dairy products and beef which are important for NZ's economy. The CAP encourages production and hence increases EU exports and reduces EU imports, respectively. Due to the importance of the EU on global agricultural markets this has an effect on world prices and therefore on NZ's export revenues. The hypothesis in this study was that a change in the CAP via decoupling of direct payments would lead to a lower production in the EU and hence would increase NZ's exports of dairy and beef products.

The objectives of this research were to compare the agricultural policy system in the EU and NZ, analyse the dairy and beef markets, develop scenarios for modelling different implementation schemes of the latest CAP reform and simulate these scenarios using a partial equilibrium trade model. The Lincoln Trade and Environment Model (LTEM) was used to estimate the expected changes in the EU's and NZ's trade in dairy products and beef resulting from the 2003 CAP reform.

Modelling results show in the dairy sector that the milk production quota increase in the CAP reform outweighs the reduction in the intervention prices for butter and skim milk powder in combination with the decoupling of the dairy premium. Although the price support in the EU dairy market is slightly reduced, producer prices will remain high so that there still is the incentive to produce at the increased quota level. The result is the opposite of the original assumption: EU exports in dairy products will increase following the reform and this implies NZ exports to fall by 1.5 per cent to 2.0 per cent. As a consequence of lower prices, the producer returns for raw milk decrease in the EU by 1 per cent and in NZ by 2 per cent. The different implementation schemes of the Member States have no influence on this result.

The model also predicts that outputs in the beef sector will be reduced as a result of the 2003 CAP reform. Beef production will become less intensive, with a reduction in the density of cows per hectare, particularly in the Member States which have fully decoupled their cattle premiums (like the United Kingdom). The modelling results show that the reduction in EU beef production, producer returns and exports is less when beef direct payments remain coupled (like in Austria and France). The market changes in the EU, however, are not well transmitted to NZ because other beef producers (like the USA) are more important in world trade. Nevertheless, there is a positive indirect impact to NZ beef producers as their returns increase due to higher world prices. NZ producer returns increase with a higher rate if full decoupling in the EU is applied than in case of only partial decoupling.

In another scenario a complete liberalisation of the EU's agricultural markets was simulated. The result shows that milk production would be higher due to the abolition of the quota, but consumption would rise to a greater extent due to lower domestic prices in the EU, leaving the implications on NZ insignificant. A complete liberalisation would lead to a change in the beef market from the EU being a net exporter to being a net importer. As a consequence, NZ beef exports would rise by 7.6 per cent and producer returns by 23.4 per cent.

This liberalisation scenario showed a result significantly different from the other scenarios modelling the 2003 reform implementations. This is explained by the fact that in the 2003 CAP reform implementation scenarios important market price support tools are included. Domestic support and trade measures prevent market forces from fully guiding production decisions and have implications on the EU's agricultural trade. NZ could gain from a further liberalisation in the EU particularly in the beef sector.

6.1 Limitations

This research has some limitations. To date, relatively little is known about the supply inducing effects of decoupled payments. Since the SFP is decoupled from production, rational thinking farmers would take the subsidy revenue and reduce their activity or stop producing if their farm income from solely market revenue would be negative. However, the absolute value of direct payments to farmers did not change with the introduction of the SFP. Outcome effects ultimately depend on farmers' behaviour and how they treat the SFP. Even if the SFP in theory is completely decoupled, some farmers will still treat it as coupled and continue producing at the same level. In this study it was assumed that the SFP will be treated by farmers as completely decoupled from production.

The introduction of cross-compliance as part of the Single Farm Payment Scheme was discussed in this report, but neglected in the trade modelling. It was assumed that the impact of cross-compliance on production might be moderate since the required environmental standards have already been existing law in all Member States. However, the pressure on farmers to comply with these regulations has increased since controls have increased. There is no data available to assess if cross-compliance encourages farmers to increase their respect for production limiting environmental legislation, nor on the penalties applied.

6.2 Contribution to the literature

Different studies about EU agricultural policy implications on international agricultural markets have been summarised in the literature review. This research is the first analysis about the implications of the Single Farm Payment particularly on New Zealand.

6.3 Suggestions for further research

Further research may include the production inducing effects of various aspects of the 2003 CAP reform. There is not much known about how farmers in reality treat the revenue from the SFP. Also, an interesting question is whether cross-compliance reduces the amount of direct payments to farmers if they do not comply. Another new aspect of the 2003 CAP reform is modulation, which means a shift of subsidies away from direct payments towards rural development. The model used to calculate the SFP can have a distribution impact: the application of a regional model brings a redistribution of direct payments among farms and this can affect total production output.

6.4 Policy implications

According to the modelling results it can be concluded that NZ would benefit slightly under a complete liberalisation of the EU dairy sector, although this would probably be the end of NZ's preferential market access to the EU butter market. However, an in-between option towards liberalisation (like the 2003 CAP reform was) would not benefit NZ. This result is relevant for NZ's negotiating policies in the WTO. It might suggest an 'all or nothing' policy – complete liberalisation or no change.

The results from the modelling of the beef sector have shown that the introduction of the SFP has positive effects on NZ. The benefits for NZ are greater if complete decoupling of direct payments in all Member States is applied. In a WTO framework, the further continuation of decoupling of domestic farm support is a policy that benefits NZ.

It can be concluded that the introduction of the SFP at least in the beef sector was an important step towards reducing production- (and hence trade-) distorting agricultural policy in the EU. This will strengthen the EU's position in the ongoing WTO negotiations.

The Single Farm Payment will play a greater role in the future of the Common Agricultural Policy. The budget for the SFP has already been increased in the recent sugar market reform this year and eventually will rise further in upcoming reforms (wine, and fruit and vegetable markets). Since the total budget for the CAP is fixed until 2013, there will be progressively less money left over for non-SFP forms of agricultural market support. In addition, the pressure to get rid of export subsidies is significant. The European Commission has shown willingness to accept the elimination of export subsidies by 2013 in the framework of the WTO Doha Round negotiations. These two factors will constrain the intervention mechanism in the milk market and therefore a further reform in the EU milk sector can be expected.

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Appendix

Table A1: Countries included in the LTEM

ID	***Country***	**ID**	***Country***
AR	Argentina	NI	New Independent States
AU	Australia	NO	Norway
CI	China	NZ	New Zealand
CN	Canada	PO	Poland
CZ	Czech Republic	SL	Slovakia
EU	European Union (15)	SW	Switzerland
HU	Hungary	TU	Turkey
JP	Japan	US	United States
MX	Mexico	RW	Rest of World

Table A2: Commodity coverage of the LTEM

ID	***Commodity***	**ID**	***Commodity***
WH	Wheat	WL	Wool
CG	Coarse grains	PY	Poultry meat
SU	Sugar (refined)	EG	Eggs
RI	Rice	MK	Raw milk
OS	Oilseeds	ML	Milk (liquid, other products)
OM	Oilseed meals	BT	Butter
OL	Oils	CH	Cheese
BV	Beef and Veal	MW	Whole milk powder
SH	Sheep meat	MS	Skim milk powder
PG	Pig meat		

Table A3: Policy variables / parameters and non-agricultural exogenous variables

Policy Variable-Domestic Market	***Policy Variables-Border***	***Non-Agricultural Exogenous Variables***
Land set-aside	Import tariff	Gross domestic product
Production quota	Export subsidy	Country price index
Support/minimum price	Trade quota	Population
Producer market subsidy	In-quota tariff	Exchange rate
Producer input subsidies	Export tax	
Producer direct payments		
Producer general services		
Consumer market subsidy		

Table A4: Direct payment expenditure in 2001 for selected schemes in the EU-15 (in million €)

Scheme	Direct Payments (€)
Suckler-cow premiums	1 705
Additional premiums for suckler-cows	72
Beef slaughter premiums	494
Beef special premiums	1 530
Beef extensification premiums	914
Additional payments to beef producers	148
Ewe and goat premiums	1 050
Ewe and goat premiums in less favoured areas	354
Aid for producers of maize	1 486
Aid for producers of cereals (except maize)	10 018
Aid for producers of soy beans, rape and sunflower seed	1 984
Supplementary aid for durum wheat	1 074
Aid for grass silage	58
Production aid for dried fodder	306
Set-aside	1 536

Table A5: Amounts of production of selected commodities in the EU-15 in 2001 (in 1 000 tonnes)

Commodity	Production (1 000 tonnes)
Raw milk (production quota)	118 392
Beef	7 361
Sheepmeat	1 098
Coarse grains	108 207
Wheat	92 103
Oilseeds	14 473

Table A6: Model results for the EU for the year 2013 (producer price (pp) and consumer price (pc) in US$; quantity produced (qp), quantity consumed (qc) and quantity traded (qt) in 1 000 tonnes; producer returns (pr) in 1 000 000 US$)

	Scenarios								
	Ref	**UK**	***per cent UK-Ref***	**AT**	***per cent AT-Ref***	**FR**	***per cent FR-Ref***	**Lib**	***per cent Lib-Ref***
ppBV	4476	3865	*-13.7*	4103	*-8.3*	4099	*-8.4*	2289	*-48.9*
ppMK	761	741	*-2.7*	741	*-2.7*	740	*-2.8*	628	*-17.4*
ppBT	6152	5970	*-3.0*	5969	*-3.0*	5964	*-3.1*	4932	*-19.8*
ppCH	8626	8374	*-2.9*	8373	*-2.9*	8365	*-3.0*	7097	*-17.7*
ppMW	3275	3168	*-3.3*	3169	*-3.3*	3165	*-3.4*	2561	*-21.8*
ppMS	3743	3628	*-3.0*	3629	*-3.0*	3624	*-3.2*	2964	*-20.8*
pcBV	3816	3865	*1.3*	3841	*0.7*	3836	*0.5*	2289	*-40.0*
pcMK	482	482	*0.0*	482	*0.0*	482	*0.0*	482	*0.0*
pcBT	5987	5970	*-0.3*	5969	*-0.3*	5964	*-0.4*	4932	*-17.6*
pcCH	8417	8374	*-0.5*	8373	*-0.5*	8365	*-0.6*	7097	*-15.7*
pcMW	3178	3168	*-0.3*	3169	*-0.3*	3165	*-0.4*	2561	*-19.4*
pcMS	3636	3629	*-0.2*	3629	*-0.2*	3624	*-0.3*	2964	*-18.5*
qpBV	9598	8774	*-8.6*	9053	*-5.7*	9076	*-5.4*	6696	*-30.2*
qpMK	118392	120505	*1.8*	120505	*1.8*	120505	*1.8*	127173	*7.4*
qpBT	1766	1805	*2.2*	1805	*2.2*	1804	*2.2*	1827	*3.5*
qpCH	7508	7645	*1.8*	7644	*1.8*	7643	*1.8*	7922	*5.5*
qpMW	828	847	*2.3*	847	*2.4*	847	*2.3*	827	*-0.1*
qpMS	987	1009	*2.2*	1009	*2.2*	1009	*2.2*	1021	*3.5*
qcBV	7142	7089	*-0.7*	7119	*-0.3*	7121	*-0.3*	10096	*41.4*
qcBT	1763	1769	*0.3*	1768	*0.3*	1768	*0.3*	1866	*5.8*
qcCH	6214	6232	*0.3*	6231	*0.3*	6233	*0.3*	6585	*6.0*
qcMW	413	413	*0.1*	413	*0.1*	413	*0.1*	446	*8.2*
qcMS	924	925	*0.0*	925	*0.0*	925	*0.1*	985	*6.5*
qtBV	2456	1684	*-31.4*	1934	*-21.3*	1955	*-20.4*	-3400	*-238.4*
qtBT	3	37	*1069.1*	37	*1078.3*	37	*1069.6*	-39	*-1339.5*
qtCH	1309	1427	*9.0*	1428	*9.1*	1425	*8.9*	1337	*2.1*
qtMW	415	434	*4.6*	434	*4.6*	433	*4.4*	380	*-8.4*
qtMS	63	84	*34.2*	84	*34.0*	84	*33.2*	37	*-41.6*
prBV	42959	33911	*-21.1*	37146	*-13.5*	37203	*-13.4*	15327	*-64.3*
prMK	90114	89283	*-0.9*	89272	*-0.9*	89196	*-1.0*	79914	*-11.3*
prBT	10866	10776	*-0.8*	10772	*-0.9*	10761	*-1.0*	9013	*-17.1*
prCH	64763	64016	*-1.2*	64005	*-1.2*	63939	*-1.3*	56222	*-13.2*
prMW	2711	2683	*-1.0*	2684	*-1.0*	2679	*-1.2*	2117	*-21.9*
prMS	3695	3661	*-0.9*	3661	*-0.9*	3655	*-1.1*	3027	*-18.1*

BV = beef and veal; MK = raw milk; BT = butter; CH = cheese; MW = whole milk powder; MS = skim milk powder

Table A7: Model results for NZ for the year 2013 (producer price (pp) and consumer price (pc) in US$; quantity produced (qp), quantity consumed (qc) and quantity traded (qt) in 1 000 tonnes; producer returns (pr) in 1 000 000 US$)

	Scenarios								
	Ref	**UK**	***per cent UK-Ref***	**AT**	***per cent AT-Ref***	**FR**	***per cent FR-Ref***	**Lib**	***per cent Lib-Ref***
ppBV	1532	1571	*2.5*	1552	*1.3*	1548	*1.1*	1788	*16.7*
ppMK	*245*	*244*	*-0.4*	*244*	*-0.4*	*244*	*-0.5*	249	*1.8*
ppBT	1952	1945	*-0.4*	1944	*-0.4*	1942	*-0.5*	1985	*1.7*
ppCH	3188	3168	*-0.6*	3168	*-0.6*	3164	*-0.7*	3213	*0.8*
ppMW	1963	1955	*-0.4*	1955	*-0.4*	1952	*-0.5*	2020	*2.9*
ppMS	2059	2054	*-0.2*	2054	*-0.2*	2050	*-0.4*	2110	*2.5*
pcBV	1527	1565	*2.5*	1547	*1.3*	1543	*1.1*	1782	*16.7*
pcMK	194	194	*0.0*	194	*0.0*	194	*0.0*	194	*0.0*
pcBT	1952	1945	*-0.4*	1944	*-0.4*	1942	*-0.5*	1985	*1.7*
pcCH	3188	3168	*-0.6*	3168	*-0.6*	3164	*-0.7*	3213	*0.8*
pcMW	1963	1955	*-0.4*	1955	*-0.4*	1952	*-0.5*	2020	*2.9*
pcMS	2059	2054	*-0.2*	2054	*-0.2*	2050	*-0.4*	2110	*2.5*
qpBV	658	659	*0.2*	656	*-0.3*	656	*-0.2*	695	*5.7*
qpMK	14689	14441	*-1.7*	14434	*-1.7*	14475	*-1.5*	14624	*-0.4*
qpBT	510	501	*-1.7*	501	*-1.8*	502	*-1.5*	509	*-0.2*
qpCH	457	449	*-1.8*	449	*-1.8*	450	*-1.6*	455	*-0.4*
qpMW	553	543	*-1.8*	543	*-1.8*	544	*-1.5*	552	*-0.1*
qpMS	380	374	*-1.7*	374	*-1.8*	375	*-1.5*	380	*-0.2*
qcBV	78	77	*-1.3*	78	*-0.6*	78	*-0.5*	72	*-8.1*
qcBT	26	26	*0.2*	26	*0.2*	26	*0.2*	26	*-0.7*
qcCH	35	35	*0.3*	35	*0.3*	35	*0.3*	35	*-0.3*
qcMW	1	1	*0.3*	1	*0.3*	1	*0.3*	1	*-1.1*
qcMS	7	7	*0.1*	7	*0.1*	7	*0.2*	7	*-1.0*
qtBV	578	581	*0.4*	577	*-0.3*	577	*-0.2*	622	*7.6*
qtBT	478	469	*-1.9*	469	*-1.9*	470	*-1.6*	477	*-0.2*
qtCH	407	399	*-2.0*	399	*-2.1*	400	*-1.8*	405	*-0.5*
qtMW	552	542	*-1.8*	542	*-1.8*	544	*-1.5*	552	*-0.1*
qtMS	373	366	*-1.8*	366	*-1.8*	367	*-1.6*	372	*-0.2*
prBV	1008	1035	*2.7*	1018	*1.0*	1016	*0.9*	1243	*23.4*
prMK	3597	3524	*-2.0*	3521	*-2.1*	3527	*-2.0*	3647	*1.4*
prBT	995	975	*-2.1*	974	*-2.2*	975	*-2.0*	1010	*1.5*
prCH	1458	1423	*-2.4*	1422	*-2.5*	1424	*-2.3*	1463	*0.3*
prMW	1085	1062	*-2.1*	1061	*-2.2*	1063	*-2.1*	1116	*2.8*
prMS	783	767	*-2.0*	767	*-2.0*	768	*-1.9*	801	*2.3*

BV = beef and veal; MK = raw milk; BT = butter; CH = cheese; MW = whole milk powder; MS = skim milk powder

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